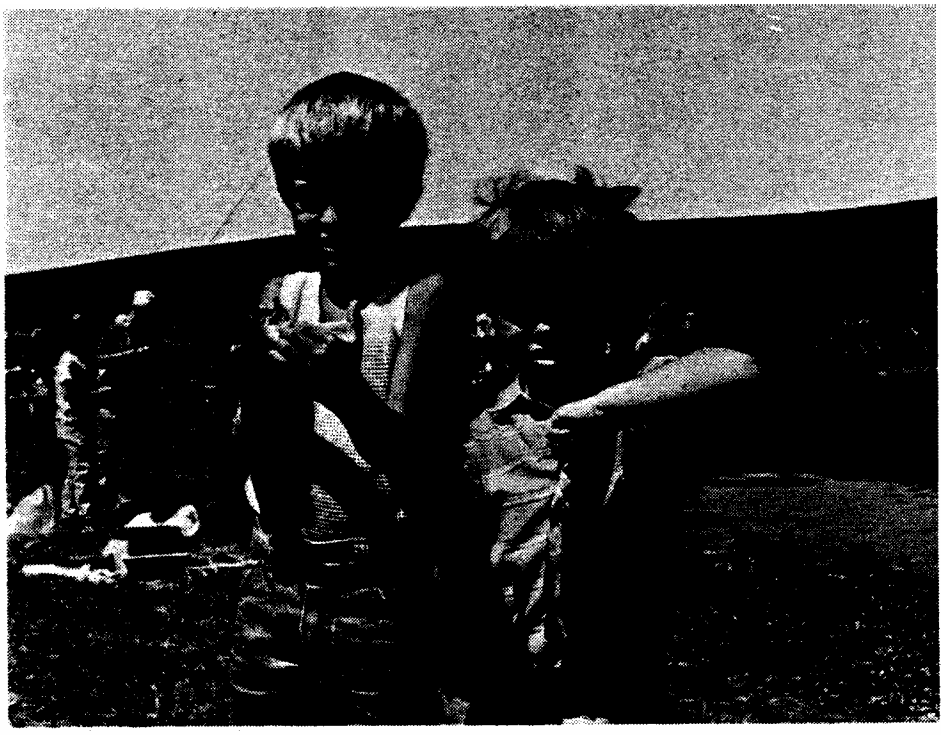
RESIDENT FISH HATCHERIES
ANNUAL REPORT

Period Covered: October 1, 1986 to September 30, 1987



July 1988

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INTRODUCTION

In the 1986-1987 fish year, Idaho resident hatcheries produced 3.3 million catchable trout weighing 1.1 million pounds. Fingerling production was 17.4 million fish weighing 206,000 pounds. On the average, 1.0 pound of fish was produced for each 1.4 pounds of feed.

Cost of production was $1.5 million for an average cost of $1.08 per pound. These costs should decrease when fish production is discontinued at Eagle and Henrys Lake. Fish distribution by tankers is not included in the above costs and adds $150,300, or an additional $0.108 per pound. Total cost per pound of stocked fish was $1.19. Cost per pound of catchable fish averaged $0.72. With distribution costs of approximately $0.11 per pound, a total cost of $0.83 per pound compares favorably with private industry costs. Cost per pound of specialty fish ranges from a Mackay low of $0.86 per pound to a high of $43.06 at Henrys Lake. However, cost per fish ranges from $0.03 to $0.12 at these same two hatcheries.

While cost per fish and cost per pound are important, more important factors are cost per fish returned to the angler, diversity of angling opportunity, effective utilization of all available fish habitat, and an effective public relations program. Resident hatcheries are making strides to meet these needs by improving facilities for early rearing with new fry and fingerling raceways at Mackay, American Falls, and Grace. The installation of another water pump at Cabinet Gorge allows better control water temperatures and thus maximize production from this facility. Cabinet Gorge will also begin a program of rebuilding a population of pure strain Gerrard rainbow or giant Kamloops in Lake Pend Oreille with a spawning run to the hatchery. Ashton has improved their rearing techniques for golden trout and grayling. In addition, Ashton is involved in rebuilding the kokanee population in Island Park Reservoir to provide both a fishery and a source of eggs. Clark Fork is in the planning stages for a new hatchery facility to produce approximately 10 million additional fry. They are also currently involved in a program to improve the genetic makeup of their Westslope cutthroat broodstock. Grace has dramatically improved the appearance of the hatchery grounds and is responsible for raising the Bear Lake cutthroat to provide both a fishery and a future egg source at Blackfoot Reservoir. Hagerman should have increased production and improved fish health when Tucker Springs is enclosed and after bird netting is installed around the raceways.

Hayspur should save $60,000 annually in egg costs and provide a strain of fish with better survival and improved return to the creel. Henrys Lake will be reduced to an egg taking station for cutthroat, rainbow-cutthroat hybrids, and Temiscamie brook trout. In addition, the person at Henrys Lake will be responsible for collecting fish management information and working on protection of the tributary streams. Mackay Hatchery will continue to produce the greatest poundage of specialty fish and will be involved in raising the Pennask rainbow for the establishment of a naturally reproducing trout population in Little Payette Lake. Nampa Hatchery has suffered through a low water year, which has forced provisions for additional water aeration. Two additional pumps, along with

improvements on existing wells, will allow improved fish production from this station in future years. Installation of bird netting and electrical fences' have dramatically improved fish health at Nampa.

All of the hatcheries have made improvements in projects involving public relations. At some hatcheries, this was done by physical improvements of the hatcheries' appearance; at other stations improved, access or informational signs and public information booths were installed. Better coverage by radio, television, and newspapers was provided. Production of the best quality fish possible is certainly our number one goal, but public relations is very important, and hatcheries will play a major role in presenting a good image.

CABINET GORGE HATCHERY

Ed Schriever, Superintendent II
Gary Bertellotti, Superintendent I

INTRODUCTION

The purpose of Cabinet Gorge Hatchery is to produce advanced stage, late-spawning kokanee salmon fry for Lake Pend Oreille. These fry are needed to mitigate the reduction of wild kokanee recruitment caused by hydroelectric power projects on the Pend Oreille watershed. The hatchery also controls timing of the release of these fish to coincide with the altered cycles of zooplankton blooms in the lake caused by Mysis shrimp.

HATCHERY IMPROVEMENTS

During the 1985-1986 production year, water temperatures from the main well field (Figure la) were inadequate to produce the minimum fry size of 1,000 per pound called for in the kokanee program. Historical temperature records showed varying temperature water sources were available on the hatchery site (Figure la).

In the fall of 1986, Idaho Department of Fish and Game's Engineering Bureau and crew developed a reverse drain field and pumping station on this spring source. A 10-inch diameter pipe connected the pump station with the incubation headbox of the hatchery. This tempering water has given this facility the flexibility to produce kokanee ranging in size from 1.5 inches to 3 inches (1,000 to 120 per pound) for a mid-July release.

More water was available from this spring source than could be pumped by the single pump that was originally installed. Also, there was a need for a pure, cold source of water for the adult holding ponds to reduce female prespawning mortality (Table 1B), more tempering water to the hatchery, and a backup pump in case of failure.

The Cabinet Gorge Hatchery staff installed a second pump and tied it into the main water line to the hatchery. This achieved a 40% gain in flow from 1,100 gallons per minute to 1,800 gallons per minute. This second pump was also plumbed to the adult holding ponds. This system is valved to run in combination, individually, or simultaneously.

The development and expansion of the lower spring system is the key to making the kokanee program more successful.

Figure 1-A. Profiles of different water sources, Cabinet Gorge Hatchery, 1986-87.

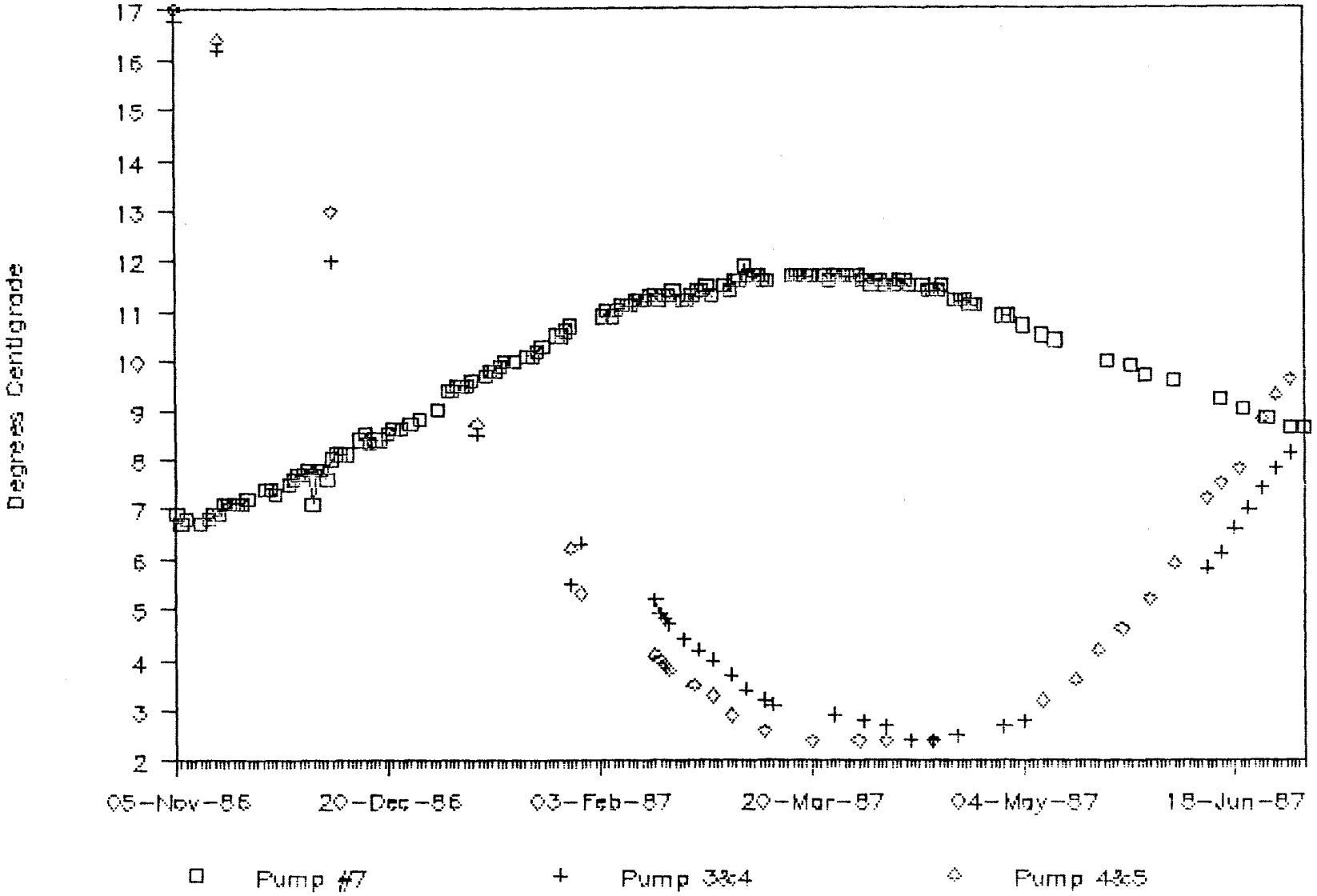


Table 1-A. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Kokanee fry	20,000,000	4,960,123	25%

Table 1-B. Late-run kokanee trapping at Cabinet Gorge Hatchery, 1986-1987.

Month	Total	Males	Females	Prespawning female mortality
Nov	1,950	1,169	781	143
Dec	935	406	529	143
Jan	66	13	53	10
Total	2,951	1,588	1,363	296

Water Temperature

Water temperature in the large well field ranged from a high of 17°C (62.6°F) on November 1, 1986 to a low of 2.3°C (36°F) on March 20, 1987. Temperatures in the tempering spring ranged from a low of 6.7°C (44°F) on November 1 to a high of 11.7°C (53°F) on March 18, 1987 (Figure 1B). Mixture of these two water sources allowed incubation water to be tempered to a range of 8°C to 11°C, except during times of pump failure. Early rearing water was also tempered during feed training (Figure lb).

FISH TRAPPING

The Cabinet Gorge fish trap was in operation from November 1, 1986 to January 9, 1987. Seventy days of trapping yielded a total of 2,951 late-run kokanee (Table 1-B).

SPAWNTAKING AND EGGS RECEIVED

Spawntaking began in early November and continued through early January. The spawning operations peaked in mid-November at Sullivan Springs and in late November at Cabinet Gorge Hatchery (Figure 2).

A total of 6,529,870 green kokanee eggs were received at Cabinet Gorge Hatchery during the 1986-1987 production year. Of these, 394,969 were collected from 1,077 female kokanee at Cabinet Gorge Hatchery; and the remaining 6,134,901 were received from the Sullivan Springs trap (Figure 3).

Figure 1b. Profile of water used in

hatchery operation, CGH, 1986-87.

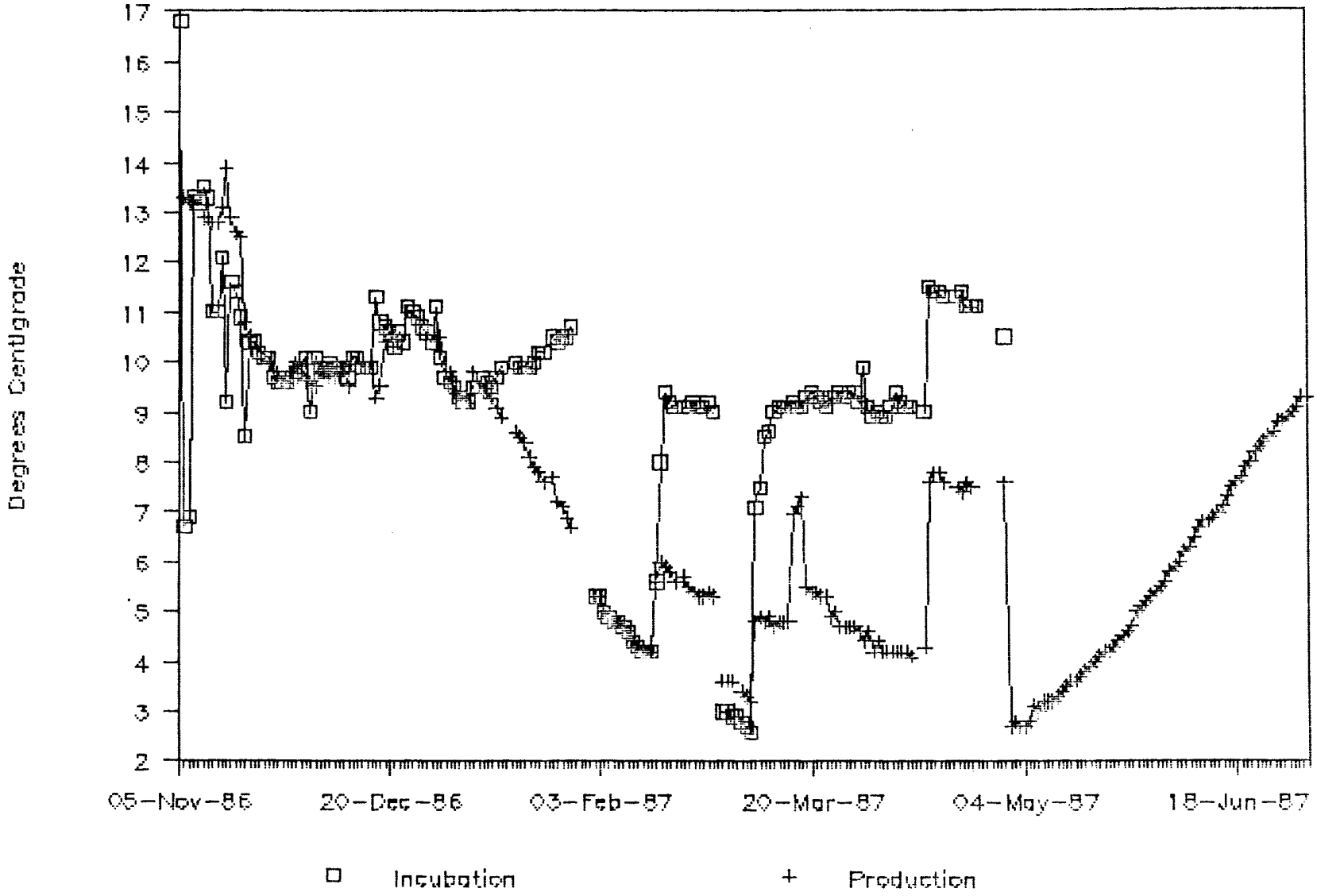


Figure 2.Egg take by date and location,

Cabinet Gorge Hatchery,1986-87.

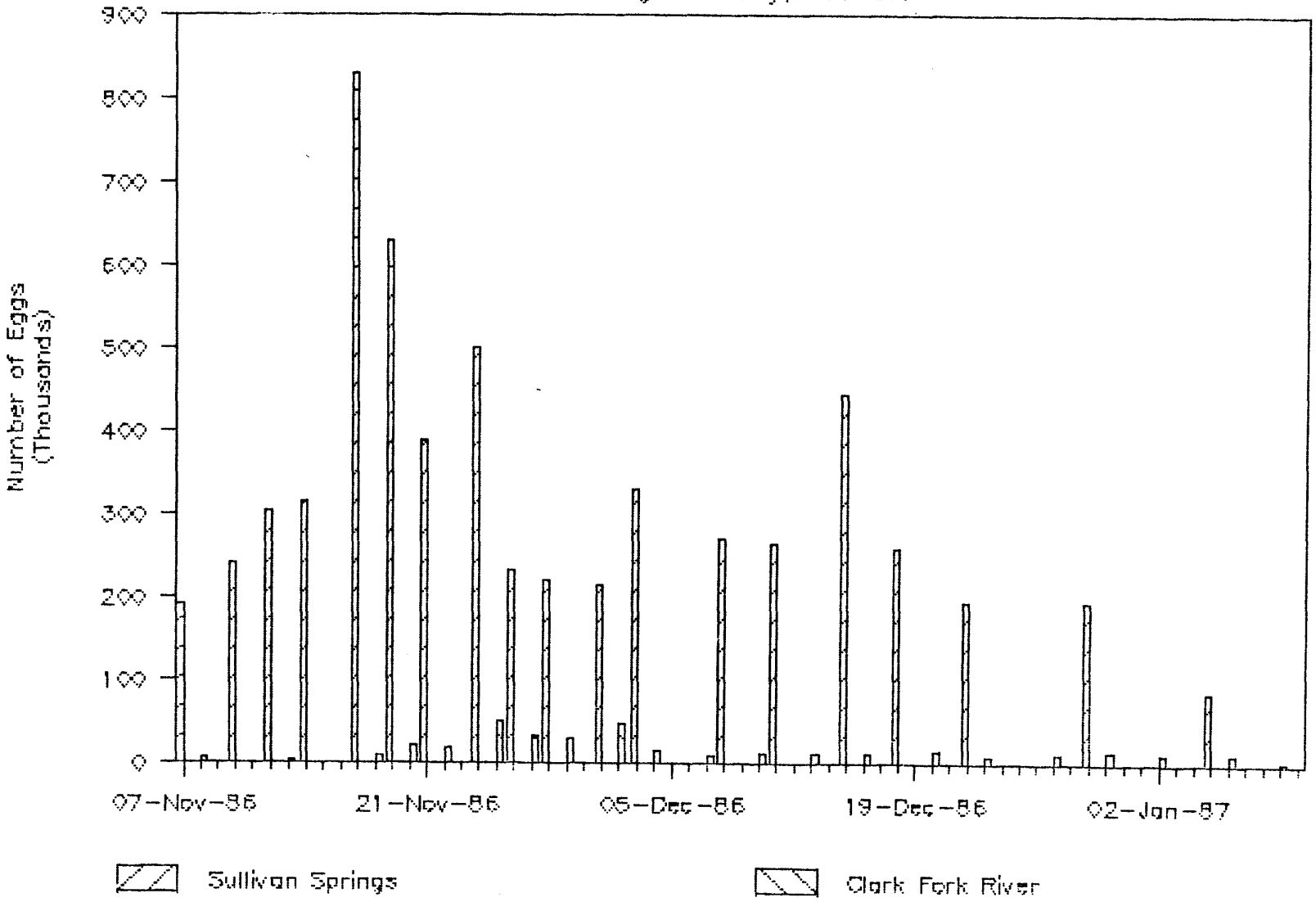
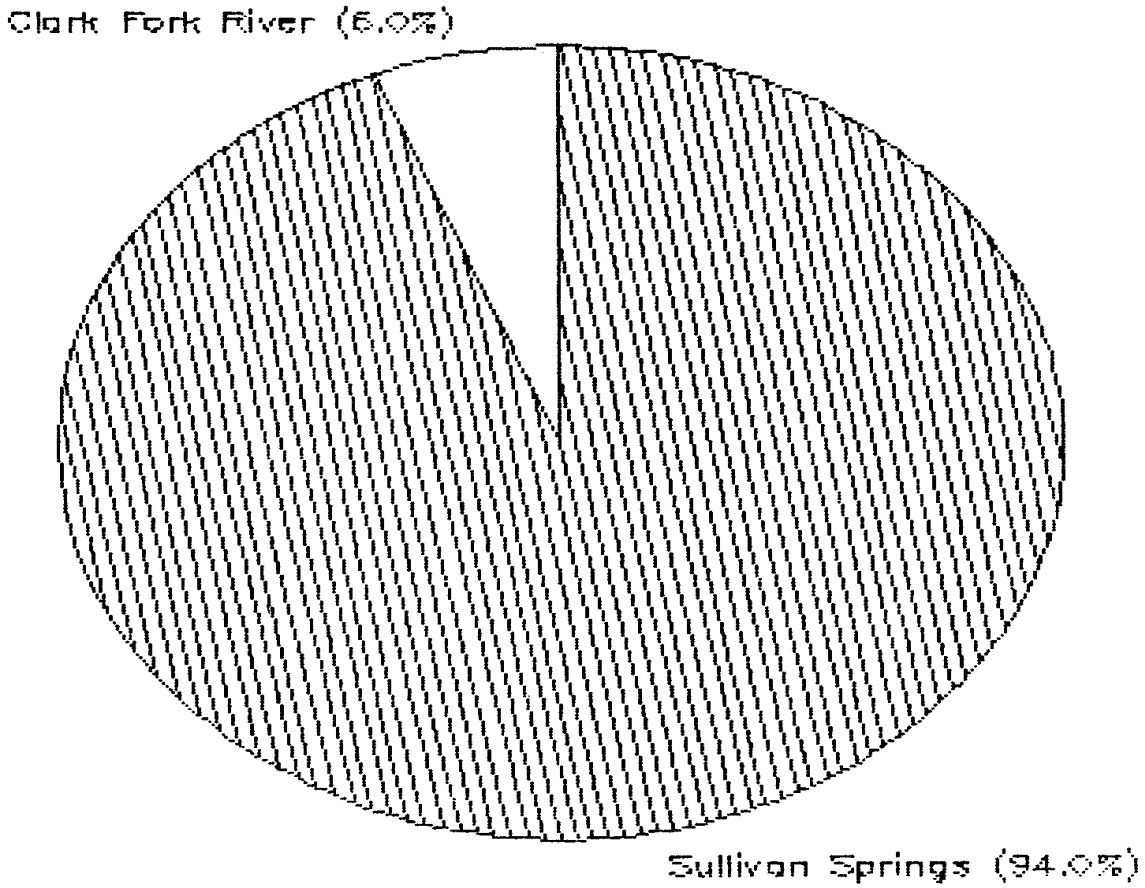


Figure 3.Percentage of eggs taken from different sources, 1986-87.



FISH PRODUCTION AND HEALTH

Survival of green eggs to feeding fry was estimated at 83.6%. Survival from first feeding to release was estimated at 90.8%, resulting in survival from green egg to release of 76% (Table 2).

All kokanee were feed trained with Rangen semi-moist diet in swim-up and number one size. Length at first feeding averages .85 inches. At 1.0 inch, fish are switched to OMP 4, 1/16 inches pellet. At 1.5 inches, the fish are fed OMP 4, 3/64 inch pellets.

Fish were fed a total of 2,200 pounds of Rangen semi-moist at a feed cost of $0.60 per pound. Lot 2 was fed semi-moist size 2 as an evaluation of a grower diet. No significant difference was detected in performance over the OMP 4; however, the Rangen did cost $0.14 more per pound. All other fish were fed the OMP 4 as a grower diet. A total of 15,774 pounds of OMP was fed. Cost of OMP was $0.46 per pound. A total of $8,576.04 was spent on fish feed for the 1986-1987 production year (Table 3).

Cost of producing fish at this facility (excluding capital outlay) this year was $11.73 per pound. Cost per 1,000 fish was $33.04 (Table 4). These costs remain comparatively high due to the subcapacity operation of the facility. A total of 4,960,123 kokanee fry were produced at an average weight of 3.55 pounds per 1,000 for a total of 13,971.67 pounds produced. These fish gained 13,154.21 pounds from 17,974.55 pounds of feed for a conversion rate of 1.37:1 (Table 5).

FISH MARKING

All fish were marked with Tetracycline. TM50 was fed at 11% of ration for 10 days. Fish released in the Clark Fork River were marked twice with TM50 as a check for a temperature-otolith mark. Fish released at Sullivan Springs were marked once with TM50 and were fed Red-10 pigment in their feed (mixed at one pound per ton of feed) for 10 weeks. This mark was not positive. Selected fish also received Bismark Brown dye and fluorescent grit marking to evaluate sampling gear efficiency (Table 6).

FISH LIBERATIONS

During July 1987, 4,960,132 kokanee were liberated from Cabinet Gorge Hatchery into the Lake Pend Oreille watershed. Of these, 3,013,705 were released into the Clark Fork River and 1,946,427 were released into Sullivan Springs, a tributary of Granite Creek (Table 7).

Table 2. Survival summary of kokanee salmon, Cabinet Gorge Hatchery, 1986-1987.

Lot no.	Number of green eggs	Survival: Green egg to first feeding	Survival: Green egg to release	Survival: Feeding fry to release
SS1	1,257,905	.688	.620	.901
SS2	1,260,238	.934	.762	.810
SS3	1,236,541	.888	.807	.916
SS4	1,198,432	.887	.817	.987
SS5	1,181,785	.829	.819	.987
CF1	394,969	.721	.698	.968
Total	6,529,870	.836	.760	.908

Table 3. Feed costs for Kokanee produced at Cabinet Gorge Hatchery, 1987.

Feed type	Pounds fed	Cost/ pound	Total cost
Rangen SM	2,200	$.60	$1,320.00
OMP 4	15,774	$.56	$7,256.04
Total	17,974	$.477	$8,576.04

Table 4. Production costs at Cabinet Gorge Hatchery, 1987.

Annual budget	Pounds produced	Numbers produced	Cost/ pound	Cost/ thousand
$163,900	13,971.6	4,960,123	$11.73	$33.04

Table 5. Kokanee production summary, Cabinet Gorge Hatchery, 1986-1987.

Lot no.	Number produced	Pounds produced	Pounds/ thousand	Feed fed	Weight gain	Conversion
SS1	779,623	2,815.34	3.61	3,654.16	2,629.22	1.39
SS2	960,666	3,464.04	3.61	4,914.73	3,377.88	1.46
SS3	997,707	3,314.88	3.32	4,327.75	3,176.33	1.36
SS4	978,993	2,006.57	2.05	2,160.50	1,842.58	1.17
SS5	967,425	1,336.71	1.38	1,515.17	1,148.36	1.32
CF1	275,709	1,034.13	3.75	1,402.24	979.84	1.43
Total	4,960,123	13,971.67	3.55	17,974.55	13,154.21	1.37

Table 6. Differential marks applied to different release groups of kokanee fry produced at Cabinet Gorge Hatchery, 1987.

Release date	Release site	Number of fish released	Marks					
			TM50	2XTM50	Grit	Temp	Red-10	Bismark brown
July 8	SS	607,825	X			X		
July 9	SS	693,940	X				X	
July 15	SS	644,653	X				X	
July 22	CGH	2,627,62		X		X		
July 22	CGH	100,000		X		X		
July 22	bridge	50,000		X		X		X
July 27	CGH	186,043		X	X	X		
July 27	bridge	50,000		X		X		X

Table 7. Late kokanee liberation from Cabinet Gorge Hatchery, July, 1987.

Date	Release site	Number of fish released	Total pounds	Length (in)	Number/ pound
July 8	Sullivan Springs	607,825	1,265.11	1.91	480.4
July 9	Sullivan Springs	693,949	1,242.84	1.82	558.4
July 15	Sullivan Springs	644,653	835.35	1.63	771.7
Subtotal		1,946,427	3,343.3	1.79	582.2
July 22	Cabinet Gorge H.	2,627,662	9,128.3	2.26	287.9
July 27	Cabinet Gorge H.	100,000	347.3	2.26	287.9
July 27	Clark Fk. Bridge	50,000	173.7	2.26	287.9
July 27	Cabinet Gorge H.	186,043	771.6	2.4	241.1
July 27	Clark Fk. Bridge	50,000	207.5	2.4	241.1
Subtotal		3,013,705	10,628.4	2.27	283.5
Total Pend Oreille drainage		4,960,132	13,971.7	2.11	355

OTHER HATCHERY ACTIVITIES

Bull Trout

Fish Trapping

The Cabinet Gorge fish ladder and trap began operating on September 16 for bull trout. This was the day after the lower spring expansion project brought water directly to the holding pond-ladder complex.

Water was tempered to approximately 9.5°C (49°F) for bull trout attraction to the ladder. Table 8 summarizes trapping activity.

Trapping mortality was due to jumping activity, either through or over anti-jump nets. This problem was corrected on September 20.

Spawntaking

Necropsy of the three female trapping mortalities revealed that all three had reabsorbed last year's eggs. On the interim ripeness check on September 21, three of four males were ripe and all females were green. When eggs were taken on September 29, seven of eight females were ripe, three of six males were dry, and the remaining three males were nearly dry.

A total of 30,736 eggs were collected from seven females on September 29, an average of 4,390 eggs per female. Spawned females averaged 566 mm (22 inches). The three males used in spawning averaged 770 mm (30 inches).

Females were hand stripped and all spawned well, with no sign of reabsorbed eggs. However, this was probably their first spawning, based on lengths. Because of the limited quantity and questionable quality of the sperm, eggs from three females were pooled and the other four females were pooled. Both egg groups were fertilized with one-half of the three male sperm pool. These eggs were held in isolation and were incubated in cold water from the lower springs.

All fish were released after spawning: one green female, seven spawned females, three spawned males, and three dry males.

Wolf Lodge Fall Chinook

Spawntaking

A total of 104,308 green eggs were collected from 20 female fall chinook in Wolf Lodge Creek, an average of 5,215 eggs per female (Table 9).

Table 8. Bull trout trapping at Cabinet Gorge Hatchery, 1987.

Date	No. of females	No. of males	Comments
9/16			Started trap
9/17	4	1	2 female trap mortalities
9/20	2	3	1 female, 1 male trap mortality
9/21		1	Spawn check: females green & males ripe
9/22			Trap off; on again in p.m.
9/23	2	1	
9/29	7	2	Released 4 green females & 1 male from the trap
Total	15	8	

Table 9. Fall chinook spawning summary, Wolf Lodge Creek, Lake Coeur d'Alene, 1987.

Date	Females	Males	Eggs/ female	Egg size	Total number of eggs
9/24	11	7	4,836	2.98/ml	53,193
9/28	5	4	5,565	3.18/ml	27,825
10/1	4	3	5,823	3.42/ml	23,290

This year's spawning operation went well. Eggs per female were low on September 24 due to two partially spawned out females. During the second and third spawn takes, we fertilized individual females with sperm from at least three males.

Changes in spawning techniques were made this year in an attempt to improve historically low eye-up percentages. Fish were spawned at sun-up in an attempt to take eggs during the coldest, diurnal water temperature. This temperature ranged between 10 and 12°C (50-54°F). Cold (6°C), clear water was hauled from the hatchery in a tank to rinse and water harden eggs. This water was supplementally oxygenated during use. All eggs were taken in a colander and dry fertilized in a bucket. Eggs were water hardened in a 1:200 (jug strength) buffered Argentyne solution for thirty minutes.

Ovarian and tissue samples were sent to Eagle Lab for disease diagnostic work.

Incubation

These eggs were held in isolation from the hatchery building and incubated in water tempered to 11°C to maximize development rates. A total of 75,770 eyed eggs (72.5% eye-up) were delivered to Mackay Hatchery.

AMERICAN FALLS HATCHERY

Gary Baker, Hatchery Superintendent II
Dave Billman, Superintendent I

INTRODUCTION

American Falls Hatchery produces catchable and fingerling rainbow trout. This past year, we produced 508,584 catchables and 279,480 fingerling rainbow.

HATCHERY IMPROVEMENTS

Major hatchery improvements were the construction of a new primary rearing building containing 14 concrete vats, 20 ft. x 4 ft. x 3 ft. The building will also contain 23 single stacks of Heath incubators, two 500 gallon per minute pumps, a backup generator system, and a feed storage room. In addition, most hatchery roads were graded and gravelled, plus the lawn area was landscaped. Aluminum siding was installed on Residence No. 1.

FISH HEALTH

Fish health was generally very good during the period; however, we did experience an outbreak of systemic bacteria in fingerling Mt. Lassen rainbow trout. This was subsequently diagnosed by the pathology staff as coldwater disease and successfully treated with medicated feed containing Oxytetracycline at 8,000 gm per ton. This disease has occurred for the last three years about three weeks after moving the fish to the large outside raceways. If it is caught at an early stage and treated, no major mortalities occur.

PUBLIC RELATIONS

Approximately 10,000 people visited the facility during this period, including the general public and various school and scout tour groups. No major media contacts were made during this period.

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Rainbow catchables	500,000	508,584	102
Rainbow fingerlings	--	279,480	--

Table 2. Eggs received at American Falls Hatchery.

Species & strain	Date received	Source	Number	Percent hatch	Destination & date	Expected yield	Cost
Rainbow R4 Mt. Lassen	Mar & Apr. 1987	Mt. Lassen, CA, PFH	750,000	90	Catchables statewide, 1988	455,000	$5,962.50

Table 3. Cost of fish production.

Species & strain	Source	Pounds planted	Destination	Percent budget	Cost
					$135,945.00
Rainbow R4 Mt. Lassen	Mt. Lassen, CA, PFH	180,306	Statewide	95%	
Rainbow R4 Mt. Lassen	Mt. Lassen, CA, PFH	6,625	Mackay & Blackfoot reservoirs	5%	$7,155.00

ASHTON HATCHERY

Rollie Warren, Superintendent II
Mel Sadecki, Superintendent I

INTRODUCTION

Ashton Hatchery is a resident fish speciality station. This past year, we raised seven species of fish: rainbow, Kamloops, brown, cutthroat, brook, and golden trout, plus grayling.

The total production for the year was 38,044 pounds and 2,086,533 fish. Fish food used was 45,200 pounds at a conversion rate of 1.18.

HATCHERY IMPROVEMENTS

Hatchery improvements included a new four-wheel-drive pickup and a wood stove pad replaced in Residence No. 1. Painting was done inside the hatchery building and around raceways.

FISH HEALTH

There were no disease outbreaks at Ashton Hatchery this year. All disease-related treatments were for prevention.

PUBLIC RELATIONS

There were approximately 1,800 people that toured the hatchery. This included about 800 school children from the surrounding area. The remainder of the tourists were made up of local people as well as nonresidents.

Ashton Hatchery was featured in two newspaper articles. The first was in conjunction with the opening of the fishing season. The second was a feature article dealing with hatchery operations.

SPECIAL PROJECTS

Kokanee Egg Take

This was the first year for operation of the Moose Creek kokanee trap. The trap was in operation from 8/11/87 through 9/21/87, and was located just downstream from the Big Springs Road.

This run has not been trapped for spawning in the last ten years, and there was no recent research available to help forecast timing, duration, or numbers of fish in the spawning run.

The total number of fish actually reaching the trap was estimated at 700. Some fish were released above the trap for natural spawning (184 total both sexes). The run never reached the levels we had anticipated, which may indicate the need to supplement the numbers of fish in this stream. The fish that reached the trap were large, up to 21 inches; the average length was 16.4 inches. Cumulative run timing was as follows: August 18, 30 fish; August 19, 100 fish; August 21, 220 fish; and August 24, 478 fish. Total egg take was 143,752 from 137 females for a average of 1,049 eggs per female.

Grayling

Grayling were successfully reared on semi-moist feed this season. The fry were started on Bio Diet and then switched to Rangen's Semi-moist feed. Success was attributed to the availability of a feed with a small enough particle size for grayling. Grayling also need to be started on feed within two to three days after hatching.

TABLE 1: PRODUCTION GOALS

SPECIES	SIZE	NO. REQUESTED	NO. PRODUCED	% OF GOAL	COMMENTS
Rainbow (RA)	Catchable	94,500	102,396	108 %	
Rainbow (RA)	Fingerling	196,000	241,484	123 %	
Kamloop (K1)	Fingerling	432,000	451,959	105 %	
Brown (BN)	Fingerling	350,000	338,240	97 %	
Brook (BK)	Fingerling	100,000	164,164	150 %	
Golden (GN)	Fingerling	3,700	4,290	114 %	
Cutthroat (C3)	Fry	1,020,000	770,500	75 %	
Grayline (GR)	Fry	14,100	13,500	97 %	

TABLE 2: SPAWNING

SPECIES: Kokanee (KE) DATES: August 21 to Sept. 21, 1987 LOCATION: Moose Creek

No. Spawned	Total Eggs	Eggs/Female	Female Age	Expec Yield	Destination/Date	Length	Cost
159	164,744	1,036	4 Years	125,000	Moose Creek/June 88	3.50”	$1,900.00

TABLE 3:EYED EGGS

SPECIES	STRAIN/SCOURCE	DATE REC	NUMBER	% HATCH	DESTINATION/DATE	EXPEC YIELD	COST	COMMENTS
Kamloop(Kl)	Skane/Shane	11-06-	192,200	922	Region 6/June 87	390,000	$3.150.00	
Brown(BN)	Ply Rock/Ply Rock	12-01-	162,000	95%	Region 916/June 87	130,000	51,125.00	
Brook(BK)	Temiscamiie/Daniel Hatch	12-05-	15,100	902	Henrys Lake/Sept 87	11,000	0.00	State of Wyoming
Rainbow(RA)	Arlee/Ennis NFH	12-08-	365,000	952	Reg 6/Apr 87-June 88	290,000	0.00	50,000 holdovers
Brook(BK)	Henrys Lake/Henrys Lake	12-13-	16,089	80%	Henrys Lake/Sept 87	28,000	0.00	
Brook(BK)	Temiscamie/Daniel Hatch	12-13-	37.362	85%	Henrys Lake/Sept 87	29.000	0.00	State of Wyoming
Brown(BN)	Ply Rock/Ply Rock	12-20-	236.250	91%	Region 1&6/June 87	185.000	$1.770.00	
Brook(BK)	Temiscamie/Brandon	12-23-	106,596	90%	Henrys Lake/Sept 87	80,000	$1,380.56	
Kamloop(K1)	Duncan River/Ennis NFH	2-04-87	51,890	91%	Region 2/Sept 87	10,000	0.00	
Cutthroat(C3)	Henrys Lake/Henrys Lake	5-21-87	138,000	85%	Teton River/Aug 8?	97,000	0.00	
Grayling(GR)	Meadow Lake/St of Wyo	5-28-87	100,000	10%	Statewide/Sept 87	25,000	0.00	Eggs soft
Cutthroat(C3)	Henrys Lake/Henrys Lake	5-28-87	115,000	80%	Teton River/Aug 87	300,000	0.00	
Cutthroat(C3)	Henrys Lake/Henrys Lake	6-20-87	176,900	82%	Teton River/Aug 87	93.000	0.00	Eggs soft
Cutthroat(C3)	Henrys Lake/Henrys Lake	6-21-87	196,560	80%	Teton River /Rug 8?	113,000	0.00	Eggs soft
Cutthroat(C3)	Henrys Lake/Henrys Lake	7-03-8?	13,500	?8%	Teton River/Sept 8?	28,000	0.00	Eggs soft
Cutthroat(C3)	Henrys Lake/Henrys Lake	7-06-87	19,110	80%	Teton River/Sept 87	35,000	0.00	Eggs soft
TOTAL			2,629,837			1,899,000	$7,125.56	

TABLE 4: FRY

SPECIES	STRAIN/SCOURCE	DATE REC	H0. YIELD	LBS. YIELD	DESTINATION/DATE	LENGTH	COST	COMMENTS
Cutthroat(C3)	Henrys Lake/Henrys Lake	5/7-8?	770,500	890	Teton River/Aug-Sept 8	1.50"	$ 2,038 10	
Grayling(GR)	Meadow Lake/Daniel Hatch	5-28-8?	13,500	22	Statewide/Sept 87	1.10"	5 50.38	State of Wyoming
TOTAL			789,000	912			S 2,088.98	

TABLE 5: FINGERLING

SPECIES	STRAIN/SOURCE	DATE REC	NO. YIELD	LBS. YIELD	DESTINATION/DATE	LENGTH	COST	COMMENTS
Rainbow (RA)	Arlee/Ennis NFH	12-08-86	242,784	4,039	Region 6/apr-July 87	3.0-4.6”	$ 9,249.31	50,000 as holdovers
Kamloop (K1)	Skane/Skane	11-06-86	421,392	7,342	Statewide/May-Sept 87	3.27”	$16,813.18	
Kamloop (K!)	Duncan River/Ennis NFH	2-04-87	43,239	497		3.20”	$ 7,220.37	
Brown (BN)	Ply Rock/Ply Rock	12-20-86	338,240	3,153	Region 4&6/June-Jul 87	3.50”	$ 1,138.13	
Brook (BK)	Temiscamie/Daniel Hatch	12-15-86	43,275	655	Henrys Lake/Sept 87	3.75”	$ 1,499.95	State of Wyoming
Brook (BK)	Temiscamie/Henrys Lake	12-13-86	34,500	522	Henrys Lake/Sept 87	3.75”	$ 1,195.38	
Brook (BK)	Temiscamie/Brandon/NY	12-23-86	72,389	1,081	Henrys Lake/Sept 87	3.75”	$ 2,475.49	
Golden (GN)	/St of Wyoming	7-23-86	4,209	250	Region 6/June-Aug 87	6.50”	$ 572.50	Planted in brood lks
TOTAL			1,200,028	17,539			$40,164.31	

TABLE 6: CATCHABLES

SPECIES	STRAIN/SOURCE	DATE REC	NO. Yield	LBS Yield	DESTINATION/DATE	LENGTH	COST	COMMENTS
Rainbow(RA)	Arlee/Ennis NFH	12-85	59,595	18,248	Region 6/Mar-Ju1 87	9.50"	$46,120.31	
Rainbow(R4)	Mt Lassen/AM Fa11s Hatch	6/7-87	44,501	15,445	Region 6/Jul-Oct 8?	9.70"	$ 3,080.05	Trans in-14,100 1bs
TUTAL			104,096	33,693			$49,200.65	

GRACE HATCHERY

Bruce Thompson, Superintendent II
Rick Alsager, Superintendent I
Brad George, Fish Culturist

INTRODUCTION

Grace Hatchery produces catchable rainbow trout and Bear Lake cutthroat fingerlings. Fish traps for cutthroat are operated on St. Charles Creek at Bear Lake and the Little Blackfoot River at Blackfoot Reservoir.

HATCHERY IMPROVEMENTS

This year, Grace Hatchery personnel made numerous improvements. Major improvements were sandblasting and repainting of the hatchery vats with specialized, long-lived, epoxy paint; construction of a seven-stall, equipment storage building (26 ft. x 84 ft.); and development of a visitor picnic area located south of the large raceways. Also, in September a private contractor was brought in to demolish the old fry ponds and build sixteen small raceways (4 ft. x 4 ft. x 40 ft). The old brood pond was backfilled and landscaped.

During the past year, major equipment that was purchased included a 1987, two-wheel-drive Chevrolet truck; riding and push lawnmowers; a weed-eater; a chainsaw; a jointer; a drill and drill press; an orbital sander; office furniture and a phone; and an electric typewriter. In Residence No. 1, a new propane furnace was installed. In Residence No. 2, all of the basement windows and the basement bedroom carpet were replaced, and a new electric range was purchased. In Residence No. 3. a wood stove and a new electric range were installed.

FISH HEALTH

Bacterial gill disease was the only pathogen problem. Overall, the fish were in excellent health.

PUBLIC RELATIONS

During the past year, there has been an increase from 2,000 visitors to over 6,000. In addition to regular visitors, hatchery personnel gave organized group tours of the facility to approximately 300 students, plus boy scouts, girl scouts, and similar organizations. In addition, some 1,500 people came for the free fishing day weekend opening of the settling pond.

Hatchery personnel also traveled to various area schools to show slide presentations on hatchery operations. Also during the past year, a picnic area was created along the south end of the large raceways, and a visitor information center was constructed.

Contacts with local newspapers during the past year included contacting four newspapers for the free fishing day settling pond opener (two of which ran follow-up articles after the opener), and a half-page article on the spawning operation at the Little Blackfoot trap was done. A photograph was also submitted of an eight-pound trout that was checked in Caribou County.

SPECIAL PROJECTS

Quincy Matteson, a Bio-aide traptender, operated the St. Charles Creek fish trap this year from April 14 to June 12. The temporary trap is annually installed on St. Charles Creek, a tributary to Bear Lake, in a cooperative effort with the Utah Division of Wildlife Resources to capture adult Bear Lake cutthroat for artificial spawning. A total of 256 cutthroat were captured this year (with the help of a morpholine drip station). On the days of May 13 and 14, St. Charles Creek was completely dewatered (below the state highway) for irrigation purposes; thus operations were temporarily at a standstill until flows could be restored. All but the required 20% (which were tagged this year), were taken to Utah's Swan Creek facility for sorting, tagging, and spawntaking. Twenty-five males and 25 females were passed over the weir to spawn naturally. This year, Utah personnel took eggs from 116 St. Charles Creek females. These fish yielded 338,934 eggs. As per agreement, the eggs were transferred to Utah's Mantua Hatchery for rearing to fingerling size and subsequent return to the lake.

From April 15 to June 3, a temporary trap was installed and operated on the Little Blackfoot River, a tributary of Blackfoot Reservoir. Doug Young was hired as a Bio-aide traptender. Grace personnel traveled to the site to spawn three- to five-year-old Bear Lake cutthroat. The morpholine-imprinted fish were attracted back to their original planting site with a morpholine drip station set upstream of the weir. Again, high temperatures (47-77°F) in the spawning tributary seemed to cause the adults to become overripe before they entered the trap for data collection and spawntaking. Of the 821,059 eggs taken this year, we are expecting a yield of approximately 225,000 fingerlings (27.4%).

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Rainbow catchables	365,000	376,000	103%
Rainbow fingerlings		80,000	excess
Bear Lake cutthroat	300,000	21,500	7%

Table 2. Eggs received at Grace Hatchery.

Species & strain	Date received	Source	Number	Percent hatch	Destination & date	Expected yield	Cost
Rainbow R1 Sand Creek Shepard of the Hills, & Ten Sleep[a]	1/7/87	Egan Hatchery, UT	639,217	90	Catchables, Regions 5 & 6, 4/88-9/88	310,000 **	$23,000
Cutthroat C5 Bear Lake	6/10/87 through 7/28/87	Egan Hatchery, UT	171,826	94.5	Subcatchables, Blackfoot Res., 6/88	50,000	$1,000

[a]Rainbow strains of Sand Creek, Shepard of the Hills, and Ten Sleep were mixed together.

Comments

Rainbow: The cost is figured from incubation to fingerling size. The cost for incubation was $6,000, and the cost for rearing was $17,000.

Cutthroat: On 8/5/87, the hatchery pipeline broke, causing an unexpected loss of fish. The cost for incubation was $600, and the cost for rearing to fry stage was $400.

**See also, Fingerling to catchable production at Grace Hatchery.

Table 3. Spawning Bear Lake cutthroat, May 5, 1987 to June 3, 1987.

Number spawned	Eggs/ female	Total eggs	Female age	Destination & date	Expected yield	Cost	Comments
776 females & 443 males	1,058	821,059	3 to 5 years	5 to 7 in., June 1988, Blackfoot Res.	225,000	$9,000 *	**

**Low egg survival can be attributed to high water temperatures (8.5 to 25°C). Losses were also incurred when the hatchery pipeline broke on 8/5/87.

*Total spawning and rearing cost to 9/30/87. The total cost for spawning was $8,000, and the total cost of rearing was $1,000.

*See also, Eggs received at Grace Hatchery (Table 2). **Eggs were combined for catchable production.

Table 4. Fingerling to catchable production at Grace Hatchery.

Species & Strain	Source & date	Received number	Received pounds	Yield number	Yield pounds	Survival From-to	Destination & date	Cost
Rainbow R8 Shephard Hills	Egan, UT; 12/18/85	270,482	Eggs**	376,299	119,920	88.9% eyed egg to fingerlings	3/87-9/87, Reg. 5/ Statewide	$91,600 65%
Rainbow R1 Ten Sleep	Egan, UT; 12/18/85	204,6256	Eggs**					
Rainbow R1 Sand Creek, Shephard Hills, & Ten Sliip	Egan, UT; 1/7/87	639,217	Eggs	80,400 Fingerling to catchable production	1,340	*	6/9/87, Dworshak Res.	$10,000 7%
Cutthroat C5 Bear Lake	L. Blackfoot River 5/30-6/8/86	190,806	Green Eggs	21,698	3,500	11.4% green egg to catchables	6/15/86, Blackfoot Res	$6,000 4%

*See also, Eggs received at Grace Hatchery (Table 2).
**Eggs were combined for catchable production.

HAGERMAN HATCHERY

Bob Vaughn, Superintendent III
Fenton Hays, Superintendent II
Paul Smith, Fish Culturist
Dave May, Fish Culturist

INTRODUCTION

Hagerman Hatchery produces both catchable and fingerling rainbow trout. Total production exceeds a half million pounds, at a cost of less than fifty cents per pound.

HATCHERY IMPROVEMENTS

Minor improvements included the replacement of our one-ton fish planting truck. A reclaimed one-half ton pickup was added to the inventory. This vehicle was much needed for hatchery administration, receiving fish eggs from air terminals, attending meetings, and general hatchery use.

A new office was refurbished and put into use. This was incorporated into one side of the duplex residence. A new vinyl floor was installed prior to the move. These quarters are spacious and create a much better hatchery office.

A new mower deck was purchased for the hatchery mower. The old rear mount mower was inadequate for quality lawnmowing. A new trimming mower was added to the inventory. A new water chiller compressor was added to the system. Efficiency has been greatly improved. Chilling capacity also increased. Two new valves were installed in the western raceway complex. One valve leaked badly and one could not be opened, making one raceway unusable. A new Honeywell computer was added to the hatchery inventory. This was a replacement for one previously here.

FISH HEALTH

IPN and IHN viruses were both active at the hatchery during the year. Susceptibility to virus seems to be size oriented; when fish reach 2 to 3 inches, they are subject to these diseases. Also, stress of any kind seems to bring it on. However, it is not dependent upon size or stress factors. It occurs in any size group and where there is no apparent stress.

We raised (K1) Skanes Kamloops and (R-4) Mt. Lassen fish this year. Many of these fish developed IPN at an early age. Many also contracted IHN as they grew larger. Thirteen protocols were prepared and reported to the Central Fish Disease Lab at Eagle Hatchery.

Two instances of a "die-off" in tanks within the hatchery building occurred. Treatment with benzylkonium chloride cleared it up immediately. Examination by a pathologist did not reveal any diseases or pathogens. However, the fish were dying in large numbers until treated.

Most fish disease diagnostic replies indicated presumptive IPN or IHN. Confirmed diagnosis generally revealed only IPN virus, especially as the year progressed. Tentatively, it appears that for now IHN at Hagerman is on the decline.

Minor outbreaks of other diseases were recorded: one brief episode of bacterial gill disease, one lot diagnosed as having columnaris also revealed IPN virus, and one lot diagnosed with peduncle disease and systemic myxobacteria. Sterilization of raceways and equipment is an ongoing practice at this hatchery.

PUBLIC RELATIONS

Hagerman Hatchery receives a large number of visitors and sportsmen throughout the year. We are surrounded by the Wildlife Management Area, which provides fishing and hunting, the year around. We have numerous school and other interested groups tour the area. The area is like an oasis in the desert. People come to fish, hunt, picnic, family get-togethers, and just to spend the day looking around. A jaw tagging operation at the hatchery conducted by the regional fishery staff attracted people's attention. We have received many tags back from sportsmen catching these tagged fish.

Our estimate of visitors at the hatchery this year was 55,000. An exceptionally warm spring and beautiful summer and fall have contributed to a heavy turnout of fishermen and visitors throughout the year. This was undoubtedly one of the largest visitor years ever at this hatchery. The weather was great, and the fishing has been excellent all year long.

SPECIAL PROJECTS

One thousand fish were jaw tagged and planted in the Snake River at Burley; 5,075 were tagged and planted at the Bell Rapids access area. These are parts of a study to monitor growth in these waters. Fish in the previous year's study grew at an accelerated rate at Bell Rapids.

Another group of K-1 Kamloops was adipose fin clipped and planted in Spring Valley Reservoir. This project was done by the hatchery for Region 2.

The hatchery crew also assisted in other projects. David May spent a week at Rapid River Hatchery spawning chinook salmon. He also assisted in removing the Deadwood kokanee trap.

Crew members worked at hunting check stations and patrolled on the pheasant season opener. They also participated in special training at the region as well as physical fitness training.

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Rainbow catchables	1,425,150	1,318,698	93%
Rainbow fingerlings	1,575,000	1,205,763	77%
Kamloops fingerlings	775,000	510,453	66%

Table 2. Eggs received at Hagerman Hatchery.

Species & strain	Date received	Source	Number	Percent hatch	Destination & date	Expected yield	Cost	Comments
Rainbow R4 Mt. Lassen	5/28/86	Mt. Lassen Farms	725,528	96%	Statewide, Apr-May	471,592	$5,768.00	
Rainbow R4 Mt. Lassen	7/30/86	Mt. Lassen Farms	124,000	88%	Statewide, May	70,928	$ 985.80	
Rainbow R4 Mt. Lassen	8/6/86	Mt. Lassen Farms	462,590	88%	Statewide, May	264,602	$3,676.88	Some eggs broken upon arrival.
Rainbow R4 Mt. Lassen	9/24/86	Mt. Lassen Farms	555,282	93%	Statewide, June	335,671	$4,135.00	
Rainbow R4 Mt. Lassen	10/22/86	Mt. Lassen Farms	475,860	98%	Statewide, Jul-Aug	303,123	$3,704.70	
Rainbow R4 Mt. Lassen	12/30/86	Mt. Lassen Farms	688,311	87%	Statewide, May	389,143	$4,762.05	
Rainbow R4 Mt. Lassen	1/21/87	Mt. Lassen Farms	316,584	93%	Statewide, May	205,780	$2,512.20	
Rainbow R4 Mt. Lassen	4/1/87	Mt. Lassen Farms	746,592	95%	Statewide, June	461,020	$5,930.70	
Kamloops K-1 Skanes	12/17/86	Skanes Trout Farm	403,680	95%	Lake Walcott-Apr Anderson Ranch & Mormon Res.-May	262,392	$2,821.00	
Kamloops K-1 Skanes	1/7/87	Skanes Trout Farm	403,650	81%	Magic Res.-May & Spring Valley Res.-Sep.	262,372	$2,821.00	Some eggs broken upon arrival.
Kamloops K-1 Skanes	2/4/87	Skanes Trout Farm	301,376	97%		195,894	$2,107.00	
Total			5,203,453			3,222,517	$39,164.71	

Table 3. Catchable production at Hagerman Hatchery.

Species	Source	Number planted	Pounds planted	Destination & date	Cost
K-1 Kamloops	Skanes Fish Farm	1,850		Spring Valley R. August	$1,873.51
R-4 Rainbow	Mt. Lassen	1,303,898	485,068	Statewide	$211,400.00
Total		1,318,698	486,918		$213,273.51

Table 4. Fingerling production at Hagerman Hatchery.

Species	Source	Number planted	Pounds planted	Destination & date	Cost
K-1 Kamloops	Skane Fish Farm	510,453	9,935	Anderson Ranch Morman Reservoir Magic Reservoir Lake Walcott	$31,600
R-4 Rainbow	Mt. Lassen	1,205,763	27,660	Roseworth Res. April Ririe Res.-May Island Park Res.-May	$63,200
Total		1,716,216	37,595		$94,800

Table 5. Fish feed used during fish year 1986-1987.

Size	Pounds	Cost
Swim-up	1,200	347.50
#1	7,700	2,233.00
#2	22,090	6,407.10
#3	27,050	7,813.00
#4	20,250	3,948.75
3/32 in. pellet	55,490	9,155.85
1/8 in. pellet	613,530	101,232.45
#2 TM	550	236.50
#3 TM	500	215.00
#4 TM	1,000	335.00
Total	749,360	$131,924.15

HAYSPUR HATCHERY

John Thorpe, Superintendent II
John Siple, Superintendent I
Kevin Price, Fish Culturist

INTRODUCTION

Hayspur Hatchery produces both catchable and fingerling rainbow trout. Fish production goals at Haypur Hatchery were met with fingerling production within 2.5% of the target goal. Catchable production exceeded the goal by 24.7%.

FISH PRODUCTION

Catchable and fingerling production is normally from eggs collected from the Hayspur strain rainbow trout held on station. As part of a broodstock management program, brood year 84 fish were branded in 1986 and appeared in the spawning population in the fall of 1986. Data collected in 1986 (Tables 2 and 3) quantifies the difference in egg quality collected from two-year-old versus 3-year-old or older female trout. The total number of eggs taken, and good eye-up (Table 2) from 2-year-old adults, was misleading in forecasting output. Survival of fry to feeding stage was very poor (Table 3), pointing out the questionable merit of taking eggs from 2-year-old spawners.

Fingerling production (Table 4) was strongly influenced by the poor quality and small size of fry from 2-year-old spawners. Most of the fry that survived to be stocked as fingerlings were from age 3+ spawners (Table 3).

Catchable production (Table 5) was much greater than could normally be expected. In a typical year, water temperatures in Loving Creek rise to 60 to 70°F afternoon peaks from April through August, requiring reduced loading of the large raceways. This critical period commences two months prior to any major catchable trout stocking in the Hayspur area. If trout had not been removed in March, mortalities would have been high with warming water.

Table 1. Fish requested and produced, October 1, 1986 to September 30, 1987.

Strain, species, & size	Production goal	Actual production	Percentage of goal achieved
Hayspur rainbow catchables	270,000	336,664	124.7
Hayspur rainbow fingerlings	725,000	707,055	97.5

Table 2. Hayspur strain rainbow trout spawning results at Hayspur Fish Hatchery, October 1, 1986 to September 30, 1987.

Number of females spawned	Eggs/ female	Total green eggs	Female age	Destination & date	Eyed eggs	Percent eye-up	Cost	Comments
898	1,360	1,248,029	2 years	Fingerling release, 1987	1,109,455	88.9		Survival to feeding fry Was poor.
405	2,379	963,431	3+ years	Fingerlings and holdovers for catchables, 1988	797,833	82.8		3+ was any nonbranded Fish.
Total 1,303	1,696	2,211,460			1,907,288	86.2	$20,600	

Table 3. Survival of eyed eggs to feeding fry taken from Hayspur strain rainbow trout broodstock.

Age of female	Number of eyed eggs	Number of feeding fry	Percent survival	Range of percent survival
Age 2	1,109,455	397,107	35.8	9.1% to 71.3%
Age 3+	797,833	659,903	82.7	18.0% to 99.2%

Table 4. Fingerling production, October 1, 1986 to September 30, 1987.

Species & strain	Source	Eyed eggs	Survival to fingerlings	Stocked as fingerlings	Destination & date	Cost	Comments
Rainbow R9 Hayspur	Hatchery broodstock	1,907,288	1,057,000	707,035	Magic and Anderson Ranch Reservoirs, Apr 1987	$37,000	349,965 fingerlings held for catchable-sized trout rearing.

Table 5. Catchable-sized trout production, October 1, to September 30, 1987.

Species & strain	Source	Number of fingerlings held on 10/1/86	Pounds at beginning	Number of catchable-sized stocked/transferred	Pounds stocked/ transferred	Percent survival	Cost
Rainbow R9 Hayspur	Hatchery broodstock	382,891	42,882	336,664	110,135	87.9	$90,000

FISH HEALTH

Health in production fish was satisfactory. Bacterial gill disease (BGD) was detected in subcatchable trout during large raceway rearing (Loving Creek) and was successfully treated with $CuSO_4$. Softshell disease in eggs taken from both 2-year-old and 3-year-old females was the most apparent problem, as it was impossible to use the electronic egg picker without rupturing excessive numbers of eyed eggs. To control this problem, research was proposed, approved, and performed on eggs to determine the effectiveness of Acriflavine and Argentyne. Both treatments were effective in preventing handling problems from softshell disease.

Infectious Pancreatic Necrosis Virus (IPNV) was detected during broodstock sampling of the Hayspur strain adults held in the hatchery broodstock pond. On two dates in 1986, a total of 140 ovarian fluid fish pool was confirmed as positive for IPNV. Samples taken in 1984 and 1985 had been negative; however, in 1983 IPNV was detected in one of 12 samples and 85 kidney, spleen, and gill tissues were collected. One five-five-fish pools assayed. A program for IPNV eradication has been included in hatchery objectives.

A proposal for isolation of disease-free broodstock replacement fish from the Hayspur population was approved in 1987 with work to begin in the fall of 1987. The project involves selection of 15 pairs of spawning fish (on three separate dates during the spawning season), spawning them individually, and incubating their eggs in isolation incubators until disease assay work can confirm or deny IPNV contamination. Disease-free fry will be raised in spring water and isolated from other fish on station until new broodstock rearing ponds become available to prevent recontamination.

PUBLIC RELATIONS

Visitor traffic was estimated at over 8,000 persons, primarily during April to September. The campground attracted an average of 15 groups per week. Ten new picnic tables were constructed by the Flyfishers of Idaho and placed within the campground (hatchery provided the materials). Ten fire rings were installed by hatchery personnel during August 1987.

We gave slide presentations to several local schools and provided guided tours for a number of organized groups throughout the year.

SPECIAL PROJECTS

Saline Solution For Increased Fertilization

During the 1986 spawning season, a test comparing fertilization of eggs in saline solution and fertilization of eggs in spring water was performed on five lots of eggs (Table 6). A 0.75% saline solution (1 ounce of uniodized table salt dissolved in 1 gallon of spring water) was added to cover pooled eggs before fertilization. The resulting eye-up was somewhat better than that obtained with spring water alone (Table 6). As a direct result of this experiment, the use of saline solution as a diluent has been incorporated into the standard spawning procedure.

Golden Trout

Golden trout were stocked by helicopter (approximately two thousand 6 to 9-inch fish per lake) in both Baker Lake (Region 4) and in Yellowbelly Lake (Region 6) to establish golden trout spawning populations. In addition to examination of both lakes as viable rearing and trapping locations, a weir was installed on the outlet of Baker Lake to prevent spawning of the Henrys Lake cutthroat previously stocked in Baker Lake.

Brown Trout

A brown trout trapping site was selected on the Big Wood River during September 1987. Trap construction and coordination efforts were commenced during August and September for a trapping season during the fall of 1987. Complete information on the trapping project, including techniques developed and lessons learned, will be compiled at completion.

Table 6. Percentage eye-up for eggs fertilized in saline solution compared to eggs fertilized in spring water.

Lot no.	Age of female	Saline solution	Spring water
6	2	89.6	82.7
7	2	90.0	89.2
8	2	94.0	93.3
9	2	92.4	87.6
11	2	85.0	85.0
Average		90.2	87.6
6	3	60.6	66.6
7	3	94.0	80.6
8	3	90.8	85.7
9	3	85.6	72.6
11	3	74.4	66.0
Average		81.1	74.3

Appendix A. Spawntaking of Hayspur strain rainbow trout broodstock, fall 1986.

Lot No.	Female age	Date	Females spawned	Green eggs	Eyed eggs	Percent eye-up	Eggs/ female	Comments
1	2	9/29/86	14	25,729	20,553	79.9	1,838	
1	3	9/29/86	2	5,545	4,621	83.3	2,773	
2	2	10/6/86	22	40,838	28,868	70.7	1,856	
2	3	10/6/86	9	24,136	19,717	81.7	2,682	
3	2	10/14/86	63	76,268	51,364	67.3	1,211	Low eye-up in Lot 3 may have been due to
3	3	10/14/86	22	48,200	26,656	55.3	2,191	elevated temperature in hardening water.
4	2	10/20/86	39	58,529	56,581	96.8	1,501	
4	3	10/20/86	32	49,181	46,932	95.4	1,537	Some partial spawning in 3+ females.
5	2	10/27/86	102	157,721	143,551	91.0	1,546	
5	3	10/27/86	55	87,507	82,981	94.8	1,591	Partial spawning in females counted.
6	2	11/5/86	108	169,173	149,652	88.5	1,566	
6	3	11/5/86	57	150,550	112,789	74.9	2,641	
7	2	11/10/86	107	157,343	146,694	93.2	1,470	
7	3	11/10/86	43	120,626	108,902	90.3	2,805	
8	2	11/17/86	155	214,561	200,718	93.5	1,384	
8	3	11/17/86	69	195,367	171,457		2,831	
9	2	11/24/86	156	165,720	148,980	89.9	1,062	
9	3	11/24/86	50	118,307	94,773	80.1	2,366	
10	2	11/30/86	79	97,647	88,161	90.3	1,236	
10	3	11/30/86	34	75,167	67,463	89.8	2,211	
11	2	12/15/86	53	84,500	74,233	87.8	1,594	Less than 15 green adult females left in
11	3	12/15/86	32	88,845	61,542	69.3	2,776	the pond at this point.

HENRYS LAKE HATCHERY

Lynn Watson, Superintendent I

INTRODUCTION

Henrys Lake Hatchery is primarily an egg taking station and ships out eyed eggs of cutthroat, rainbow x cutthroat hybrids, and brook trout.

HATCHERY IMPROVEMENTS

Major hatchery improvements included complete exterior painting and repair of all hatchery buildings and residences and reconstruction of predator screens for the fish ladder. In addition to major improvements, the following projects were completed:

1. Construction of storm windows, repair of plumbing and septic tank, installation of heating tape, repair of the water supply junction box, provision of a refrigerator and couch inside the cabin;

2. Construction of stationary racks for ladder predator screens;

3. Accurate enumeration of pond fry during release via the ladder;

4. Supplying of a fish-free water source for washing eggs in the spawnhouse; and

5. Construction of metal rack partitions to replace wooden racks in the spawnhouse.

FISH HEALTH

Brood year pathogen survey of April cutthroat adults detected subclinical enteric redmouth (ERM). No other pathogens were reported.

PUBLIC RELATIONS

Approximately 300 visitors requested tours of the hatchery and approximately 500 were provided with information concerning hatchery operations, management programs and fishing advice. In addition, several hundred used the hatchery for a fishing access to the lake. Support activities and information were provided to local sportsmen groups and landowners.

Table 1. Egg requests.

Species & strain	Eyed Egg goal	Production	Percentage of goal achieved	Percent eye-up attained
C-3 Cutthroat	2,800,000	2,602,000	93	66
C-3 x Rainbow Hybrid				
Normal (KLC, RLC, & R7C)	175,000	140,000	80	26
Heat (KLC)	100,000	99,000	99	37
Hormone (KLC, RLC)	125,000	132,000	105	51
Brook (Naturalized)[a]	100,000	83,000	83	76
Brook (Temiscamie)	150,000	120,000	80	75

[a]This report includes brook trout eggs requested for and produced in calendar year 1987.

Table 2. Fish requests and production.

Species & strain	Goal	Production	Percentage of goal achieved	Cost
C-3 Cutthroat fingerlings	500,000	340,000	68	$4,200
C-3 Cutthroat spawners transported to tributaries				
Howard Creek	1,500	1,800	120	
Targhee Creek	3,000	0	0	

Key: C-3 = Henrys Lake cutthroat trout
KLC = Kamloops rainbow trout
RLC = Redband rainbow trout
R7C = Eagle Lake rainbow trout

Table 3. Egg shipments.

Species & strain	Number of eggs	Destination	Cost	Comments
C-3 Cutthroat	1,000,000	Ashton		
	1,120,000	Mackay	$6,300	
Subtotal	2,120,000			
C-3 Cutthroat x Rainbow Hybrids				
Kamloops	283,000			Ennis NFH
Redband	54,000			Ennis NFH
Eagle Lake	34,000			Creston NFH
Subtotal	371,000	Mackay	$630	
Brook (Naturalized)	37,000	Ashton		Duck Cr. trap
Brook (Temiscamie)	120,000	Ashton		Hatchery creek
Brook (Naturalized)	46,000	Clark Fork	$1,200	Duck Cr. trap
Subtotal	203,000			
Grand total	2,694,000		$8,130	

HENRYS LAKE STERILE HYBRID EXPERIMENTS

1981 to 1987

In 1981, experiments were conducted to determine the feasibility of producing triploid hybrids using heat-shock. These studies showed it was possible to do so within a limited range of temperatures. In 1985, two heat-shock methodologies were developed at Henrys Lake to compare sterilization success, egg and fry survival, and applicability to large-scale production programs. Previous tests indicated a thermal immersion at 27°C, lasting for 25 minutes, at 25 minutes postfertilization, induced triploidy. The improved technique of recirculating heated water over incubation eggs was developed as an offshoot of the basic technique.

The recirculating technique definitely allowed expansion of the production potential to about 100,000 eggs per man-hour and may have improved survival slightly. These findings can be summarized as follows:

1. Triploidy induction using heat-shock under normal hatchery conditions can be highly variable (even though applied under similar test conditions).

2. Triploidy induction as well as survival may depend on egg quality (Figures 1 and 2), which is not always subject to close control.

3. Survival of early developmental stages is consistently and seriously lower than controls and highly variable.

In 1987, it took one million green eggs to produce 250,000 fingerlings due to unexpected losses prior to hatching. This year-to-year variability makes the heat-shock technique basically undesirable for our purposes.

As first suggested by Rohrer in 1984, there exists a handful of alternatives to heat-shock. One of the most promising is the treatment of early stages with the androgenic steroid, 17-alpha-methyltestosterone (MT). In 1986, FDA approval for experimental drug testing was sought and obtained. Literature sources indicated that sterility could be achieved at varying dosage levels and over a range of early developmental stages. Experiments in 1986 were based on Hunter's work with coho salmon as depicted in Table 1.

FIGURE 1. Effect of egg quality (control survival) on percent Triploidy of heat-shocked eggs. Curves fitted by eye.

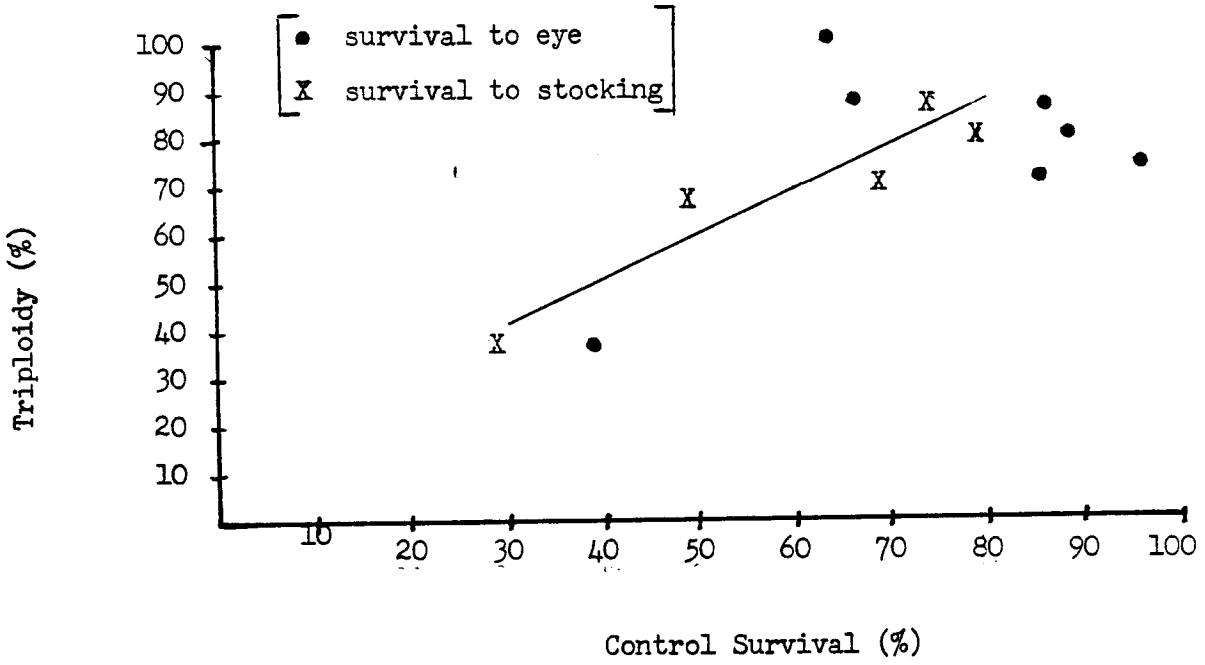


FIGURE 2. Effect of egg quality on percent survival of heat-shocked eggs.

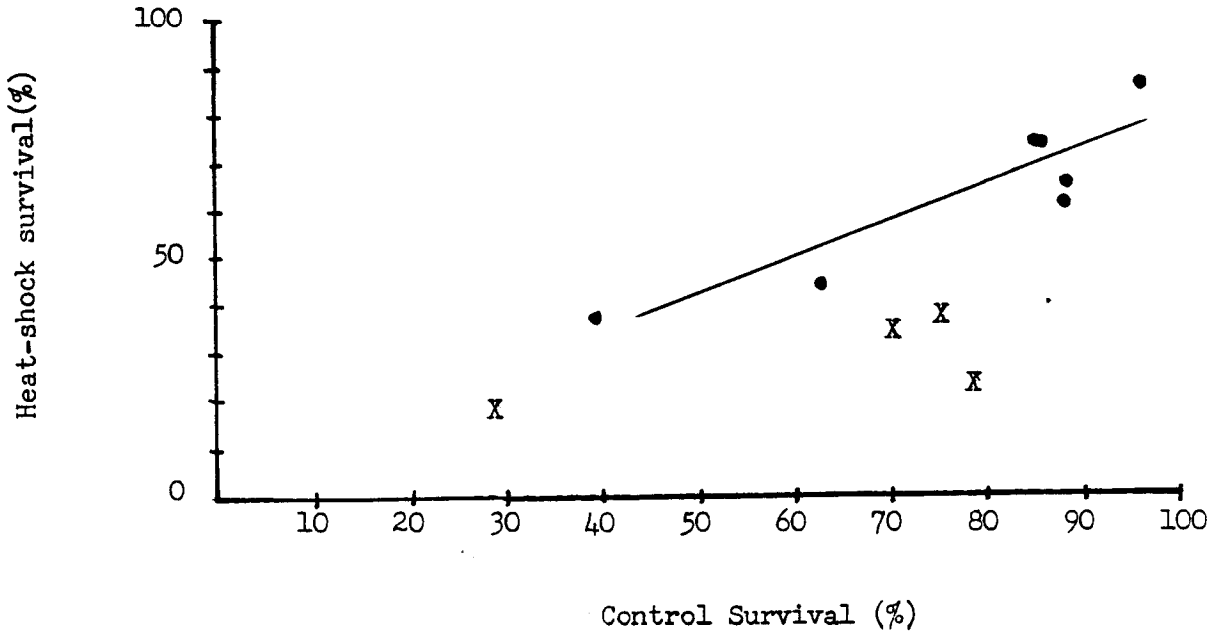


Table 1. MT treatment schedule for drip only and for drip plus feed test groups.

Hormone preparation	Application	Developmental stage	Treatment duration	
			Drip-only	Drip + feed
0.4 mg/L[a]	recirculation	eyed egg	2 hours	
0.4 mg/L	recirculation	eyed egg	2 hours	
0.4 mg/L	recirculation	sac-fry	2 hours	
0.4 mg/L	recirculation	sac-fry	2 hours	
10 mg/kg of feed	topical (on feed)	1st feeding		90 days

[a]Hormone dissolved in 5 to 10 ml ethyl alcohol. A stock solution containing 10 ml in 50% alcohol may be stored for several months.

Sample calculation:

Total incubation volume = 200 L (approximately 7 Heath trays)
Amount of chemical to equal 0.4 mg/L = 80 mg
Weigh out 0.5 g (500 mg) and dissolve in 25 ml alcohol, giving 20 mg/L.
Take 4.0 ml of this solution to equal 80 mg of MT, or
Expand incubation volume to 1,250 L for 0.5 g.

The egg trays are prepared with a premeasured volume of water and a recirculating pump is activated so the system can be observed for proper function before adding the chemical. When the system is stable and water volume is known, measure chemical needed for 0.4 mg/L, dissolve in alcohol, and add to the flowing system. Allow 15 minutes for thorough mixing; then add eggs (with volume taken into account to prevent spillage of water). Temperature may rise slightly due to heat of the pump.

Developmental stage at which eggs are treated is based on temperature units to hatch (Hunter et al. 1982) as shown in Table 3.

Table 3. Treatment regime for cutthroat eggs and fry.

Henrys Lake Cutthroat Temperature Units to Hatch=510; 13 TU/day @ 45°F

Percentage of TUs at hatching	TU @ treatment*	Days postfertilization
63	320	27
78	400	33
102	520	Hatch + 1 day
116	590	Hatch + 6 days

*If eggs are shipped to a facility with a different water temperature, the schedule must be adjusted to reflect different TUs.

The shelf life of MT is uncertain, and it may deteriorate at room temperature over time. It is suggested that feed containing MT not be stored for more than three days and should be kept frozen if mixed a few days in advance. MT is dissolved in alcohol, diluted in fish oil, and sprayed on feed to achieve thorough mixing. Control groups for growth comparisons should also be treated with fish oil and otherwise reared similarly to test groups.

Toxicity data concerning MT is not available, but normal precautions used for any potentially harmful substance should be observed--wear gloves and a mask when handling the chemical, wipe up all spills, avoid dust production, handle feed with gloves, and avoid breathing feed dust. Preparation of stock solution in alcohol to be pipetted with a safety bulb may reduce exposure risk.

In 1986, histological preparations were made from small groups of treated and untreated fish to determine gonadal development (Table 4). It is apparent that hormone-treated fish underwent significant gonadal inhibition. The drip-only group did not exhibit as great a degree of sterility as did drip-plus-feed group. Sample sizes are too small to permit any accurate calculation of relative percentages of gonadal change; until more adult fish are examined, the conclusions to be drawn from these tests are limited.

Again in 1987, the drip-plus-feed method was used (Table 4); but due to unknown causes, the few fish that were sampled did not show the same degree of sterility as in 1986. The presence of incomplete sterility ("abnormal") is reminiscent of literature findings in which low levels of hormone induced limited gonadal inhibition, and these fish later regenerated functional gonads. The only confirmed difference between the two years was in the oil carrier used to top the feed--fish oil in 1986 and vegetable oil in 1987. Growth rate comparisons suggest the fish-oil-fed fish grew better than the vegetable-oil-fed fish. If the oil type influenced feeding rates, then this could have affected drug uptake rates. The method used to measure and mix the chemical is also crucial for reproducible results.

Future studies should focus on evaluation of the stocks as they recruit to the fishery to determine actual sterility of mature adults. In view of the undesirability of personnel to exposure of MT, it would also be advantageous to perform tests to determine the feasibility of producing completely sterile adults from egg and sac-fry treatments alone, or attempt to reduce the feeding time necessary.

Table 4. Gonad examination of MT-treated and untreated hybrids comparing drip-only and drip-plus-feed regiments, 1986 and 1987.

Treatment	Number examined	Normal	Abnormal	Sterile
		1986		
Heat-shock	8	1	6	1
Drip-only	4	2	2	0
Drip-plus-feed	7	0	1	6
Control	7	7	0	0
		1987		
Drip-plus-feed	19	1	16	2
Control	10	8	-[21-* 0	0

*These two gonads were not classified as either normal or abnormal.

LITERATURE CITATIONS

Hunter, G. A., E. M. Donaldson, F.W. Goetz, and P. Edgell. 1982. Production of all female and sterile coho salmon and experimental evidence for male heterogamety. Trans Amer Fish Soc 111:367-372.

HENRYS LAKE SPERM VIABILITY STUDIES

1986-1987

The success of the hybrid (cutthroat x rainbow) program at Henrys Lake depends initially on the ability to obtain good quality rainbow sperm. Kamloops rainbow from Ennis National Fish Hatchery broodstock normally enter peak gamete production in mid-February, but Henrys Lake cutthroat are not ripe until early March. Past experiences with exogenous sperm sources have been frustrating because of unexpectedly poor egg survival presumably due to low sperm quality. Poor eye-up survival necessitates last minute scrambling to locate rainbow sperm and often results in using a strain other than Kamloops.

In the past, sperm viability was assessed using motility, but this method did not reliably predict fertilization success. Good motility (swimming activity when activated by water) sometimes does not correlate with good viability (ability of sperm cell to fertilize the egg and produce a viable zygote), while poor motility may not necessarily be related to poor viability. If sperm viability could be accurately judged prior to commitment of resources, and in a time frame which would allow for readjustment of egg production, the production of hybrids would be more reliable and consistent.

A differential stain developed for use in the livestock industry to determine sperm viability is applicable to normal hatchery operations and capabilities. The following experiments describe preliminary tests with. two main objectives: (1) to determine the feasibility of the procedure for use in normal hatchery operations, and (2) to assess the reliability of the procedure for predicting fertilization success.

Materials:

5% aqueous Eosin Y (A)
10% aqueous Nigrosin (B)
Microscope, slides, eye-dropper, and immersion oil

Procedure:

Add one drop of A to one drop of semen on a slide, mix; then add one drop of B, mix, and smear (blood smear), flame fix. Read under oil, count viable (unstained) versus nonviable (stained purple), and calculate percent viability. Three replicates per slide are recommended. The entire procedure requires about 15 minutes (Blom 1950; Cambell et al. 1956; Fribourgh 1966; Williams et al. 1950; U.S. Fish and Wildlife Service 1984).

1986

In preliminary tests using sperm from overripe Kamloops, there was 93-99% unstained cells in freshly stripped samples. Two days later, up to 50% of the cells were partially stained (pinkish). It was noted that egg lots fertilized with sperm that had been stored for two days had generally poorer survival than egg lots fertilized with fresh sperm. The incidence of partially stained cells may, therefore, be correlated to eye-up success, but this will require further testing. The proportion of darkly stained cells did not change appreciably over time, but the incidence of partially stained cells did change. The only firm conclusion drawn from these tests was that the procedure was adaptable to hatchery operations.

1987

Table 1 presents the results of several test groups prepared with the intention of: (1) determining the significance of the partially stained subpopulation in regard to overall viability, and (2) correlating viability counts to fertilization success.

Table 1. Sperm staining and egg viability.

Container (number=age in days)	Replicates	Cell counts: Percent viable[a]	Cell counts: Percent viable[b]	Cell counts: Total count	Percent eyed
A-1	3	66	40	711	
A-2	2	76	57	464	
D-2	6	88	76	604	25
D-2-E (Cortland's)	6	98	73	885	31
D-4	5	93	67	708	40
D-4-E (Cortland's)	6	98	71	486	38
D-6	3	98	63	464	24
D-6-E (Cortland's)	6	99	57	801	56

[a]Percent calculated from: $\frac{\text{unstained + partial}}{\text{Total}} \times 100$
(i.e., darkly stained only counted as bad).

[b]Percent = $\frac{\text{unstained}}{\text{Total}} \times 100$
(i.e., darkly + partially stained counted as bad).

(Total = unstained + partial stain + darkly stained)

Column a represents the number of viable cells when partially stained cells are counted as good, whereas column b represents the number of viable cells when partially stained cells are counted as bad. It is evident that counting partially stained cells dramatically affects the viability counts. Whereas there is no apparent change in viability over time when only darkly stained cells are counted as bad, there is a gradual decrease in viability counts over time when partially stained cells are also counted as bad. A gradual increase in bad cells is what one would expect of a population of sperm cells kept under anything but ideal conditions outside the living organism. No correlation was found between viability counts and subsequent egg survival. The egg quality in 1987 was generally very poor, and this may have masked the effect of varying sperm quality. Eye-up success is usually at least 60Z in normal years, even in late egg batches.

Lot D was divided into two groups: one with Cortland's Semen Extender and one without. The extender did not affect either viability counts or egg survival. Again, without knowing the effect of poor egg quality on overall fertilizability, it is difficult to assess the true effect of the extender at this time. Normally, the extender would be expected to enhance viability and perhaps improve eye-up survival.

Future work will continue to examine the role of the partially stained cells in determining overall sperm viability--this characteristic must be clarified before meaningful results can be obtained. Also, the relationship of viability to egg survival should be established; if there is no relationship, the original purpose of the technique is not achieved. Lastly, Corland's Extender can be used to further define the relationships between viability, egg survival (fertilization), and the effect of enhancing agents on these parameters.

LITERATURE CITATIONS

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Cambell, R. C., H. M. Dott, and T. D. Glover. 1956. Nigrosin-eosin stain for differentiating live and dead spermatozoa. Journal of Agricultural Science 48 1:1-8.

Fribourgh, J. H. 1966. The application of a differential staining method to low-temperature studies on goldfish spermatozoa. Progressive Fish Culturist 4:227-231.

Williams, W. W., and O. J. Pollak. 1950. Study of sperm vitality with the aid of eosin-nigrosin stain. Fertility and Sterility 1:178-181.

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MACKAY HATCHERY

Bill Doerr, Superintendent II
Ivan Talbott, Superintendent I
Julia Rensel, Fish Culturist

INTRODUCTION

The Mackay Fish Hatchery operates under "specialty" status, specializing in the production of fry and fingerlings for statewide distribution.

Net production for the year was 3,271,240 fish, weighing 125,890 pounds.

HATCHERY IMPROVEMENTS

1. We have added two 2 ft. x 2 ft. x 16 ft. fiberglass troughs and a 6 ft. circular tank to our nursery space during the year.

2. A vacuum-type raceway cleaning system was purchased during the year. Its use has improved fish health dramatically as the fish no longer have to swim in the daily cleaning waste.

3. A 7 ft. x 9 ft. bay door was installed in the feed room during the last year. This has made the task of moving feed in and out of the building much simpler and allows us to store one day's feed in the pickup at night inside the building.

4. A computer was installed in the office during the last year.

5. A filter was installed in the domestic water line to trap sand and gravel, which has plagued us for the last three years.

6. New carpets, linoleum, and a wood stove have been installed in Residence No. 2.

7. Much of the old electrical wiring on the hatchery was replaced by the Department's electrician, which brought us to compliance with the State electrical code.

8. The fish culturist position, removed temporarily in 1983, was reinstated in May of 1987. This has helped greatly in the ever-increasing production at the hatchery.

FISH HEALTH

No infectious diseases were experienced this year. Sunburning has been a problem in some of our wilder lots. Sunshades have been built for the small raceways to reduce the exposure to sunlight and to calm the fish.

PUBLIC RELATIONS

Approximately 700 people toured the hatchery during the year. Due to its remote location and unfavorable climate, few people actually seek out the hatchery. Most are hunters and fishermen who happen here incidental to other activities.

The local newspaper reporter was taken on several fish stocking trips, and three news releases were prepared on plants for Mackay Reservoir.

Several groups from Mackay and Arco schools were given tours. A joint educational effort by the Soil Conservation Service, U.S. Forest Service, Bureau of Land Management, and Idaho Department of Fish and Game was conducted at the hatchery for junior high students.

Table 1. Fish requested and produced at Mackay Hatchery, 1986-1987 Fish Year.

Species & size	Production goal (by 1987 fingerling request form)	Actual production	Percentage of goal acheived	Comments
Rainbow (R1) fingerlings	138,000	199,200	144%	Requests were changed during the production year.
Rainbow (R2) fingerlings	2,000	0	0%	No eggs received.
Rainbow (R5) catchables	133,400	141,786	106%	Requests were changed 14 months into production.
Rainbow (R6) fingerlings	80,000	50,443	63%	60,000 eggs received.
Rainbow (R7) fingerlings	80,000	153,890	192%	Extras used as R1.
Brown trout fingerlings	174,000	187,475	108%	
Coho salmon fingerlings	1,608,000	1,615,000	100%	
Fall chinook fingerlings	98,000	99,900	102%	Requests were changed during the production year.
Cutthroat (C2) fingerlings	32,000	0	0%	No eggs received.
Cutthroat (C3) fingerlings	1,855,000	713,805	58%	1,080,000 eggs received.
Rainbow x cutthroat hybrid fingerlings	300,000	255,540	85%	
Kokanee (KE) fry	1,000,000	0	0%	No eggs received.

Table 2. Survival and cost of fish reared at Mackay Hatchery, October 1, 1986 to September 30, 1987.

Species, strain & size	Percent survival from egg or fish year to stocking	Cost	Cost/ fish	Comments
Rainbow R1 Tensleep & Shephard of the Hills (fingerlings & catchables)	83.7%	$13,142	$.0659	Percent survival to 9/30/87
Rainbow R4 Mt. Lassen catchables	95.4%	$ 5,271	$.5379	1.38/lb. at release
Rainbow R5 Mt. Shasta catchables	98.1%	$48,318	$.3408	
Rainbow R6 Lake McConaughy fingerlings	83.3%	$ 538	$.0106	
Rainbow R7 Eagle Lake fingerlings	61.4%	$ 1,315	$.0086	
Brown trout fingerlings	92.3%	$ 1,923	$.0103	
Coho salmon fingerlings	67.2%	$27,435	$.0170	
Fall chinook salmon fingerlings	72.9%	$ 2,138	$.0214	
Henrys Lake cutthroat fry & fingerlings	66.1%	$ 4,175	$.0058	
Rainbow x cutthroat RC hybrid fingerlings	70.9%	$ 2,042	$.0081	

Table 3. Fish production at Mackay Hatchery, October 1, 1986 to September 30, 1987.

Species & strain	Lot Number	Source	Received as	Number received or carried over (*)	Percent hatch	Yield number/ pound	Destination	Comments; size at release
Rainbow R1 Tensleep & Shephard of the Hills	7-U-Ut	Egan, SFH, Utah	eyed eggs	237,795	90.4%	199,200/ 22,836	Iron Lake & holdovers for 1988 catchables	Fingerlings & catchables
Rainbow R4 Mt. Lassen, CA	5-U-Id-16	McCall SFH, ID	fry	10,267*	NA	9,789/ 7,100	Mackay Reservoir	*From 1985-86 Fish Yr. catchables
Rainbow R5 Mt. Shasta, CA	6-En-R5	Ennis NFH, MT	eyed eggs	144,581	NA	141,786/ 65,086	Region 6	*From 1985-86 Fish Yr. catchables
Rainbow R6 L. McConaughy, NE	6-En-R6	Ennis NFH, MT	eyed eggs	493*	NA	493/ 20	Mackay Reservoir	*From 1985-86 Fish Yr. fingerlings
Rainbow R6 L. McConaughy, NE	7-En-R6	Ennis NFH, MT	eyed eggs	60,000	91.6%	49,950/ 705	Lost Valley & Mackay reservoirs	Adipose-clipped fingerlings
Rainbow R7 Eagle Lake, CA	6-CT	Creston NFH, MT	eyed eggs	496*	NA	493/ 21	Mackay Reservoir	*From 1985-86 Fish Yr. fingerlings
Rainbow R7 Eagle Lake, CA	7-Ct-R7	Creston NFH, MT	eyed eggs	249,638	86.2%	153,397/ 1,751	Lost Valley Reservoir, Upper Payette Lake, & Capehorn Lake #2	Fingerlings; strain evaluation
Brown trout Plymouth Rock, MA	6-Sr	Saratoga, NFH, WY	eyed eggs	203,110	98.5%	187,475/ 2,591	Region 4	Fingerlings
Coho salmon Columbia River	7-WS	Williard-White Salmon NFH, WA	eyed eggs	2,402,000	91.6%	1,615,000 36,950	Cascade, Island Park, Ririe, & Sublett reservoirs	Fingerlings

Table 3. Continued.

Species & strain	Lot number	Source	Received as	Number received or carried over (*)	Percent hatch	Yield number/ pound	Destination	Comments; size at release
Fall chinook salmon Great Lakes	6-U-Wi	Wild Rose SFH, WI	eyed eggs	136,909	98.6%	99,900/ 2,880	Coeur d'Alene L.; Mormon, & Chesterfield reservoirs	Fingerlings
Cutthroat trout C3 Henrys Lake	7-Id-C3	Henrys Lake SFH, ID	eyed eggs	1,080,000	79.3%	713,805/ 5,623	Henrys Lake, Horsethief & Sublett reservoirs	Fry & fingerlings
Rainbow-cutthroat RC hybrids (C3 x Kamloops)	7-RCN	Henrys Lake SFH, ID	eyed eggs	78,000	73.0%	54,990/ 650	Henrys Lake	Fingerlings
Rainbow-cutthroat RC hybrids (C3 x Kamloops)	7-RCH	Henrys Lake SFH,	eyed eggs	98,000	59.0%	48,300/ 600	Henrys Lake	Sterilized with heat shock. Adipose fin-clipped fingerlings
Rainbow-cutthroat RC hybrids (C3 x redband)	6-HRN	Henrys Lake SFH, ID	eyed eggs	27,000	81.0%	22,050/ 350	Henrys Lake	Fingerlings
Rainbow-cutthroat RC hybrids (C3 x R7)	7-H	Henrys Lake SFH, ID	eyed eggs	31,000	95.0%	25,200/ 400	Henrys Lake	L. ventral fin-clipped fingerlings
Rainbow-cutthroat hybrids (C3 x Kamloops) (C3 x redband) fingerlings	7-RCHOR	Henrys Lake SFH, ID	eyed eggs	122,000	92.0%	105,000/ 750	Henrys Lake	Sterilized with methyl-testosterone; R. ventral fin-clipped

McCAll HATCHERY

Paul Abbott, Superintendent I

INTRODUCTION

Designed primarily to produce summer chinook salmon (Oncorhynchus tshawytscha), McCall Hatchery is also responsible for hatching and rearing various trout species for stocking in area waters as well as operating a catchable-sized rainbow trout (Salmo gairdneri) redistribution program. Funding for these two resident fisheries programs is provided by the Idaho Department of Fish and Game during the period of April 1 through September 30 annually.

Table 1. Results of cutthroat trout spawntaking operations at Fish Lake, 1987.

Species	Females spawned	Number of eggs collected	Percent eye-up	Average fecundity
Cutthroat	959	463,890	67.2	493
Cutthroat culls	115	53,680	57.5	471
Total	1,074	517,570	mean=66.2	mean=491

SPAWNTAKING OPERATIONS

Operation of the trap at Fish Lake began on April 8 and continued through May 17, 1987. During this period, a total of 4,486 westslope cutthroat trout were trapped. This total, however, is thought to be artificially high due to suspected movement of fish between the trap and holding ponds. Females trapped ranged in size from 8.66 inches (220 mm) to 18.11 inches (460 mm) with a mean total length of 12.4 inches (314.9 mm) (Figure 1). Males were slightly larger, ranging in size from 8.46 inches (215 mm) to 15.75 inches (400 mm) with a mean total length of 13.02 inches (330.66 mm) (Figure 2).

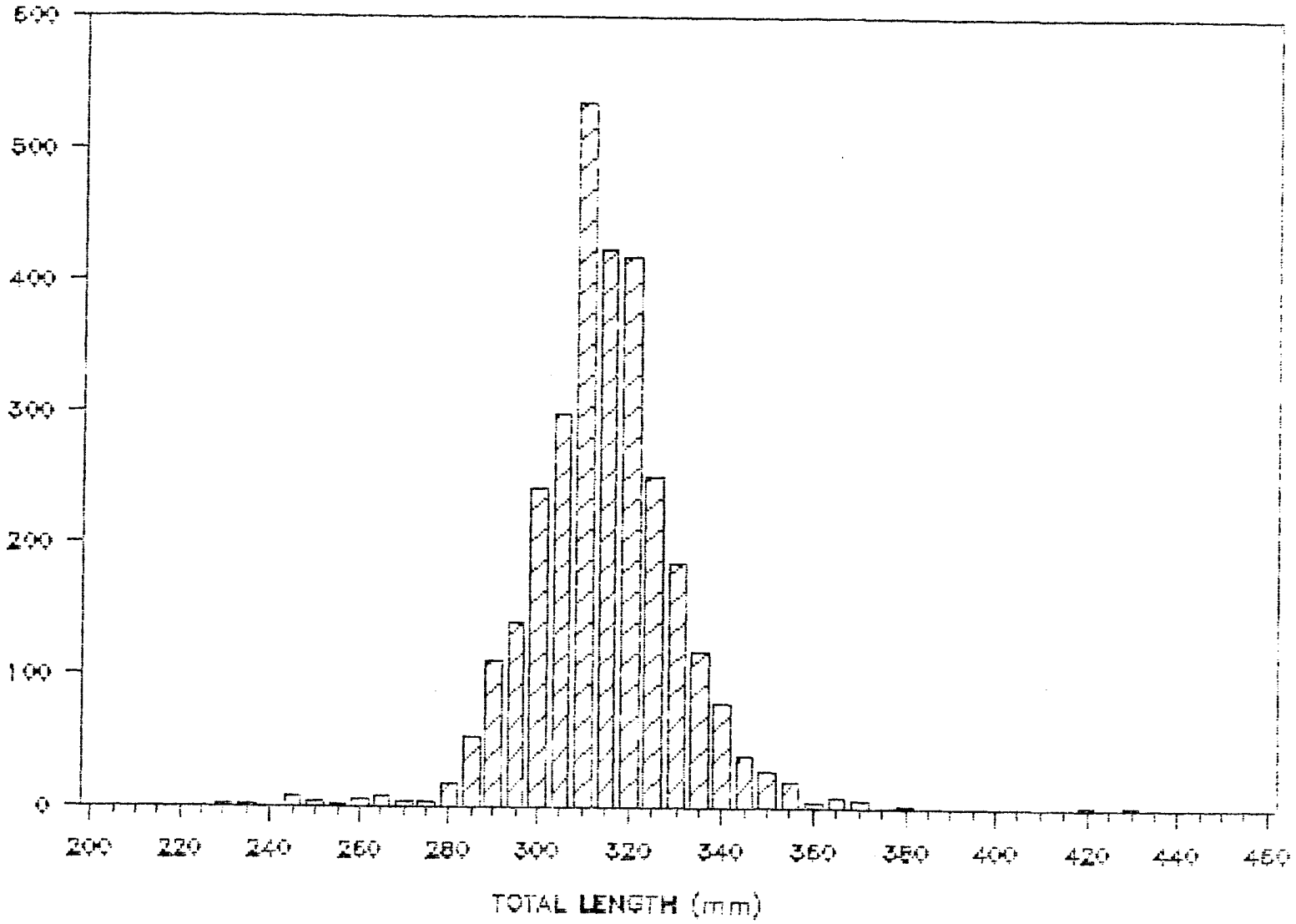

Figure 1. Length frequency of female westslope cutthroat trout trapped in 1987.

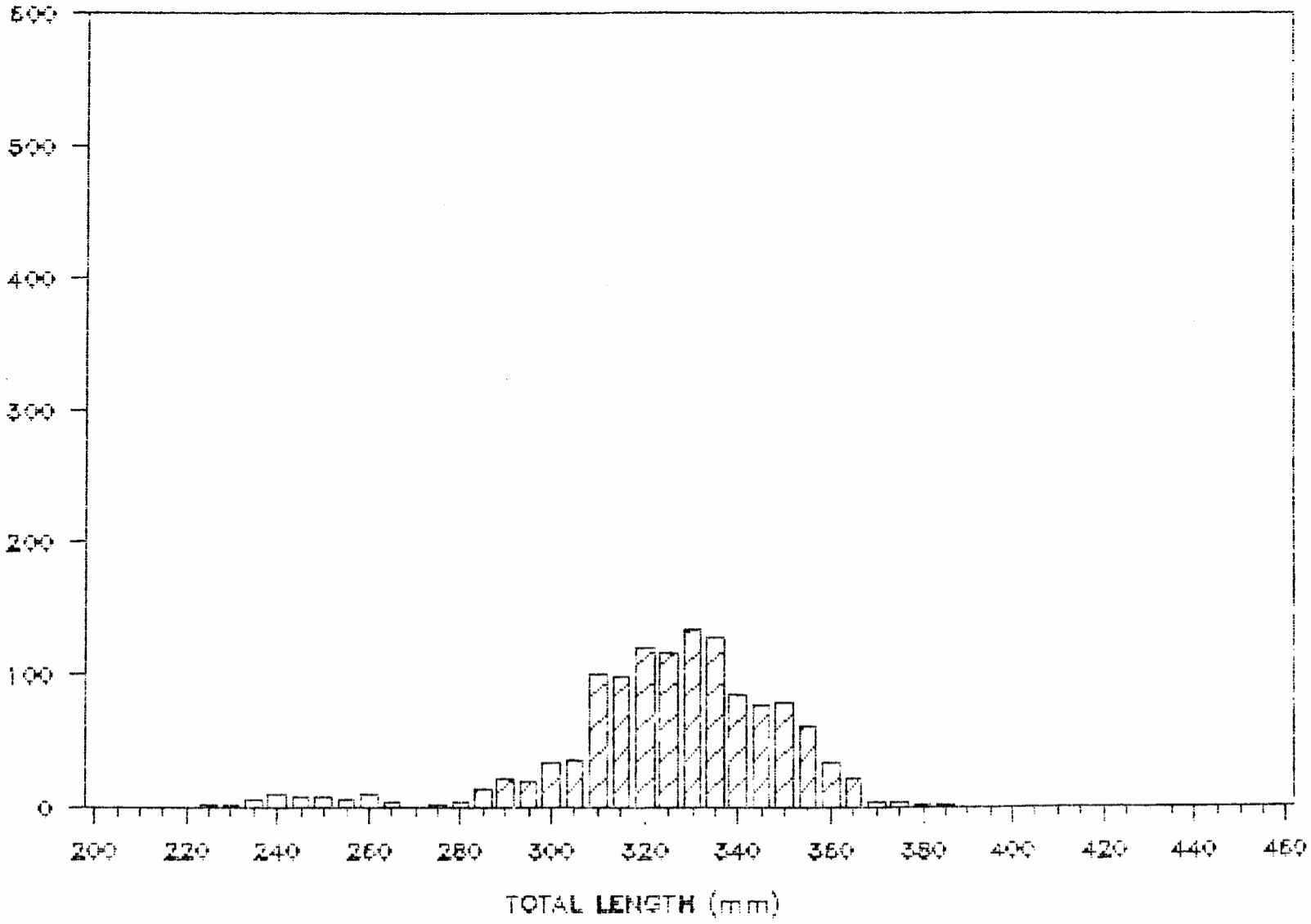

Figure 2. Length frequency of male westslope cutthroat trout trapped in 1987.

Spawning operations began on April 22 and continued through May 18, 1987, on a twice weekly basis. As done in 1986, all fish exhibiting obvious rainbow trout characteristics were spawned separately and removed from the Fish Lake population. Eggs collected from these culls were incubated and reared separately at McCall Hatchery and planted into waters where an unspecified cutthroat stock was requested. A summary of spawning activities is presented in Table 2.

Table 2. Total production of cutthroat and rainbow trout fry at McCall Hatchery, 1987.

Species	Eyed eggs received	Fish produced	Percent survival	Pounds produced
Cutthroat	311,734	184,085	59.1	455.34
Cutthroat culls	30,866	11,390	36.9	49.50
Rainbow	100,000	68,960	68.9	136.81
Total	442,600	264,435	mean=59.7	641.65

FISH PRODUCTION

Only two species of trout were hatched and reared at McCall Hatchery this year. Eggs for the production of westslope cutthroat were obtained from spawntaking operations at Fish Lake, while rainbow trout eggs were purchased from Mt. Lassen Trout Farms, Red Bluff, California. A summary of total fish production at McCall Hatchery is presented in Table 3. Essentially all production goals were net or exceeded at McCall Hatchery in 1987 (Table 3).

Table 3. Fish requested and produced at McCall Hatchery, 1987.

Species & size	Production goal	Actual production	Percentage of goal achieved	Cost
Cutthroat trout fry	200,000	195,475	98%	$15,496
Rainbow trout catchable redistribution	126,250	124,780	99%	$8,642
Rainbow trout fry	57,000	68,960	120Z	$5,662

FISH STOCKING AND TRANSFERS

Fry Transfers

During August, a total of 26,125 westslope cutthroat fry and 4,460 rainbow fry were transferred to Mackay Hatchery to fill high mountain lake stocking requests in Region 6. An additional 29,610 cutthroat fry in excess of hatchery needs were transferred to Mackay in October (Table 4).

Table 4. Fry transfers from McCall Hatchery, 1987.

Species	Number transferred	Pounds transferred	Receiving station
Cutthroat trout	55,735	197.39	Mackay
Rainbow trout	4,460	4.40	Mackay
Total	60,195	201.79	

Broodstock Transfers

During spawning operations at Fish Lake, all broodstock exhibiting rainbow trout characteristics, such as weak throat slashes, irregular spotting pattern, or large scales, were culled from the population and transferred to Goose Lake. A total of 250 fish (208 pounds or 94.3 kg) were culled from the population this season.

Catchable Stocking

Redistribution of catchable-sized rainbow trout began on May 13 and was completed on September 3, 1987. With the exception of the Secesh River, all catchable stocking requests were met this season. A total of 124,780 catchables (42,034 pounds or 19,066.3 kg) averaging 2.96 fish per pound were stocked into 44 lakes, streams, and reservoirs throughout regions 2 and 3. This figure is slightly down from the 139,587 fish (39,494 pounds or 17,914 kg) stocked in 1986.

Fry Stocking

Fry were stocked into 172 mountain lakes during 1987. This total is comprised of 169 lakes that were stocked by fixed-wing aircraft, 2 that were stocked by U.S. Forest Service helicopter, and 1 that was stocked by horseback. Low water conditions in Elk Lake (Catalog #06-00-00-0357) and Quad Lake (Catalog #05-00-00-0120) prevented them from being stocked as planned. All other lakes were stocked as requested. Total cost for aircraft rental was $4,006.40, or $23.71 per lake as compared to $27.40 per lake last year. The packstock and the U.S. Forest Service helicopter were made available at no charge. In addition to mountain lake stocking, four lowland lakes were stocked by truck. A summary of fry stocking operations is presented in Table 5.

Table 5. Results of fry stocking by method and species from McCall Hatchery, 1987.

Stocking method	Species	Number stocked	Pounds stocked
Air	cutthroat trout	123,650	232.51
Air	rainbow trout	49,900	88.82
Air	grayling	1,333	15.50
Horsepack	cutthroat trout	700	1.04
Truck	cutthroat trout	15,390	73.90
Truck	rainbow trout	14,600	43.59
Total		205,573	455.36

FISH FEED UTILIZED

All trout reared at McCall Hatchery during 1987 were fed Rangens soft-moist diet in various sizes. A total of 400 pounds (181.4 kg) of feed were used to produce 641.65 pounds (291.05 kg) of trout at a cost of $261.06, or $0.41 per pound of fish ($0.90 per kg) produced.

NAMPA HATCHERY

Walt Rast, Superintendent II
Bob Esselman, Superintendent I
Todd Garlie, Fish Culturist

INTRODUCTION

Nampa Hatchery produces catchable and fingerling rainbow trout. Grayling fry were experimentally raised during the past year.

HATCHERY IMPROVEMENTS

The small raceways were enclosed with an eight-foot chain link fence in October of 1986. The expense of this fence was virtually covered because of better fish survival due to reduced bird depredation and disease brought in by birds.

The area adjoining the office parking lot was seeded to lawn and we installed a sprinkler system. Arbor-vitae was planted along a portion of the hatchery boundary fence.

The office was partitioned off to make a better working area for hatchery personnel. A large area was also set up for a visitor information and education display area.

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Grayling #1	experiment	1,333	100
Rainbow R4 12	25,000	251,710	1,006
Kamloops K1 #2	70,000	408,795	583
Rainbow R4 #3	585,900	633,188	108
Kamloops K1 #3	0	25,245	excess

FISH HEALTH

Fish disease was minimal this past year at Nampa. Blue-green algae caused mortality in some Kamloops and R4 rainbow for about four weeks during October. Bacterial gill disease occurred during the spring months in the fingerling rainbow. The maximum daily mortality never exceeded 0.1X.

PUBLIC RELATIONS

Estimated visitor count at the hatchery this past year was 4,623. The hatchery crew was involved eight times with loading and planting of fish with local TV coverage. The newspapers put out information four times concerning planting of fish in streams, lakes, and reservoirs.

The conference room and facilities were utilized by three to five different sportsmen organizations for their monthly meetings. Normal attendence ranges from 20 to 60 people.

The Fly Fishing Club came out five times from 5:00 p.m. to 10:00 p.m. and fished the settling pond. Any fish they caught were released into Wilson Drain. The Veteran's Home and State School came out and fished the settling pond nine times during the warmer months of the year.

SPECIAL PROJECTS

Engineering installed a light on each of the well pumps, so if a pump goes out, the light will go off. A warning horn was installed in the generator room so if both the auxillary power and Idaho Power electricity go off, then the horn will sound. A telephone alarm system was also installed to call the office and each home in case of power failure. It has worked very well. Lightning arrestors were installed to protect pumps and electrical equipment during power problems.

Table 2. Eggs received at Nampa Fish Hatchery, October 1, 1986 to September 30, 1987.

Species/ strain	Received date	Source	Number	Percent hatch	Destination & date	Expected yield	Cost	Comments
RB/R4	10/8/86	Mt. Lassen	250,000	87	Regions 2 & 3	180,000	$1,997.50	
KM/K1	10/29/8	Skane	250,000	85	Region 3	180,000	$1,750.00	
KM/K1	12/5/86	Skane	250,000	85	Region 3	180,000	$1,750.00	
RB/R4	3/4/87	Mt. Lassen	250,000	86	Region 3	180,000	$1,987.50	
RB/R4	4/8/87	Mt. Lassen	250,000	85	Region 3	180,000	$1,987.50	
GR	5/27/87	Wyoming	50,000	3	Region 3	1,333	0.00	experiment
RB/R4	6/9/87	Mt. Lassen	250,000	85	Region 3	180,000	$1,987.50	
RB/R4	9/16/87	Mt. Lassen	200,000	85	Region 3	145,000	$1,590.00	

Table 3. Fry production at Nampa Fish Hatchery.

Species/ strain	Source & date	Received number	Yield number	Yield pounds	Survival from egg to planting	Destination & date	Cost	Comments
GR	Wyoming 5/88	50,000	1,333	15.5	2.6	Region 3 Mtn. lakes	$415.89	Soft shelled experiment test survival in 58°F water.

Table 4. Fingerling production at Nampa Fish Hatchery.

Species/ strain	Source & date	Received number	Yield number	Yield pounds	Survival to plant	Destination & date	Cost
Rainbow R4 KM/K1	Mt. Lassen, 10/8/86	300,000	251,000	17,200	83%	Region 3, 6/87	$14,040.36
	Skane 10/29/86 12/5/86	500,000	409,000	17,150	78%	Region 3, 4/87	$13,999.55

Table 5. Catchable production at Nampa Fish Hatchery.

Species/ strain	Source & date	Received number	Yield number	Yield pounds	Survival	Destination egg/plant & date	Cost	Comments
RB/R4	Mt. Lassen 3-6, 9 & 12/87	1,150,000	633,000	202,000	56%	Statewide; all year	$165,033.00	3 lots went through IHN during 85-86 fish year.
KM/K1	Skane 10/86	250,000	25,000	8,000	73%	Region 3; 9/87	$6,244.70	Most were planted as fingerlings.

CLARK FORK HATCHERY

Gene McPherson, Superintendent II
Dan Beers, Superintendent I

INTRODUCTION

Clark Fork Hatchery produced over three million fish during the past year. Kokanee amounted to 1.6 million of these, with cutthroat trout amounting to almost 1 million. Kamloops, brown, brook, and grayling were also produced in small numbers (Table 1).

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Rainbow (R4) catchables	114,000	115,100	1012
Cutthroat (C2) fingerlings	210,000	111,007	53%
Cutthroat (C2) fry	662,225	680,922	103%
Kamloops (K2) fingerlings	20,000	6,930	352
Kokanee (KL) fry	2,007,100	1,651,200	82%
Brown (BN) fry	172,500	376,550	2182
Brook (BK) fingerlings	73,000	72,578	992
Grayling (GR) fry	4,500	3,000	66%
Golden (GN) fry	1,000	0	No fry received

HATCHERY IMPROVEMENTS

There were no major improvement projects undertaken at Clark Fork Hatchery this year. The well and piping installed last year are in operation and functioning as expected. Very preliminary studies are in the works for future reconstruction at Clark Fork.

Two off-site improvements were completed this past year. The first was the purchase of a large, seaworthy boat for use in the winter kokanee spawning operation. The second was the remodification of part of the kokanee trap to improve fish passage to increase the egg take.

Two new kitchen stoves were purchased and installed in residences 1 and 2. Two new wood stoves were purchased and installed in residences 2 and 3.

FISH HEALTH

In February of 1987 when the cutthroat fry were moved to the outside raceways from the hatchery building, they displayed very abnormal behavior when the container was approached for feeding or cleaning. The fish would exhibit a tail-chasing behavior and subsequent death. The suspected, but unconfirmed cause, was a vitamin deficiency causing them to be light sensitive.

In early August 1987, the mortality counts in the same lot of fish rose to above normal rates. The external symptoms indicated bacterial kidney disease, which was later confirmed by the Eagle Lab.

A change was made from OMP moist feed to Rangens soft-moist with favorable results. This feed is fed from initial feeding to planting. The cutthroat, brown trout, and Kamloops fry and fingerlings have done quite well. A reduction in mortality with an increase in growth was experienced.

PUBLIC RELATIONS

There were over 1,500 visitors touring the hatchery this past year, along with eight school tours conducted during the spring.

The hatchery's role in "Big Water Management in North Idaho" was filmed by KAID TV from Boise. The kokanee spawning operation at Sullivan Springs made the news on one of the Spokane TV stations. The "FISH AND GAME NEWS" also carried an article and pictures on the kokanee operation. Jack McNeel put out an article on the cutthroat fry plants in the tributaries of Priest Lake.

A visitor center is in the planning stages to be ready for tourists next spring.

Table 2. Eggs or fish received at Clark Fork Hatchery, 1986-1987.

Species & strain	Date received	Source	Number	Percent hatch	Destination & date	Expected yield
Kokanee KL	11/12/86	Spring Creek	1,360,000	83%	Priest Lake, 7/87	1,000,000
Kokanee KL	11/12/86	Sullivan Springs	1,200,000	83%	Sullivan Springs, 7/87	1,000,000
Brown BN	12/19/86	Plymouth Rock	400,000	96%	Region 1, 6/87	360,000
Kamloops K2	4/87	Spring Creek	18,000	77%	Spring Creek, 5/88	13,000
Cutthroat C2 Fish Lake	5/87	broodstock	1,271,800	65%	Priest Lake, 7/87	600,000
Cutthroat C2 Clark Fork	5/87	broodstock	498,600	65%	Mountain Lake/ Priest Lake, 6 & 7/87	300,000
Rainbow R4 catchables	3/7/87	American Falls	117,810		Region 1, 4/9/87	117,000
Brook BK fingerlings	5/87	Eagle	73,000		Region 1, 5/87	72,500
Grayling GR fry	8/87	Ashton	3,000		Mtn. Lakes, 8/87	3,000

Table 3. Spawning operations at Clark Fork Hatchery, 1986-1987.

Species/ strain	Number spawned	Eggs/ female	Total eggs	Destination & date	Expected yield	Cost
Kokanee KL Sullivan Springs	20,961	350	7,336,514	Pend Oreille Lake, 7/87	5,800,000	$5,300
Kokanee KL Clark Fork	3,818	350	1,360,679	Priest Lake, 7/87	1,000,000	$ 500
Cutthroat C2 Fish Lake	2,051	618	1,271,800	Priest L., Mtn. lakes 7 & 8/87	800,000	$5,900
Cutthroat C2 Clark Fork	1,146	1,146	489,600	Priest Lake, 7/87	300,000	included above
Kamloops K2	4	4,500	18,000	Spring Creek, 4/88	13,000	$ 400

Table 4. Fish redistributed and cost.

Species & strain	Source	Destination	Cost	Cost/ fish
Rainbow R4/R8 catchables	American Falls/ Nampa	Region 1	$8,000	$.069
Brook BK fingerlings	Eagle	Perkins & Bloom lowland lakes	$400	$.006
Grayling GR *fry*	Ashton	Long Mtn. & Smith lakes	$180	$.06

Table 5. Survival and cost of fish reared at Clark Fork Hatchery, 10/1/86 to 9/30/87.

Strain/species/size	% survival from egg or previous fish year to plant	Cost	Cost/ fish	Comments
Cutthroat C2 fingerlings	33%	$39,296	$.30	Lost fish due to a vitamin deficiency.
Cutthroat C2 fry	61%	$20,062	$.02	Good first year survival.
Kamloops K2 fingerlings	87%	$ 640	$.09	
Kamloops K2 fry	77%	$ 900	$.06	
Brown trout BN fry	94%	$ 5,100	$.01	Includes egg purchase cost.
Kokanee KL fry	66%	$11,012	$.01	

Table 6. Fry production at Clark Fork Hatchery, 1986-1987.

Species & strain	Source	Number received	Number yielded	Destination & date
Kokanee KL	Sullivan Springs	1,000,000	900,000	Sullivan Springs, 7/87
Kokanee KL	Spring Creek	1,000,000	750,000	Priest Lake, 7/87
Cutthroat C2	broodstock	1,150,000	680,922	Priest Lake tributaries & Mtn. lakes, 7/87
Fish Lake/Clark Fork			394,219	Fingerlings/broodstock, 6/88, 6/89
Brown BN	Plymouth Rock	384,000	376,553	Regions 1 & 3, 7/87
Kamloops K2	Spring Creek	14,000		Fingerlings, 5/88

Table 7. Fingerling production at Clark Fork Hatchery, 1986-1987.

Species/ strain	Source	Number received	Number yielded	Destination & date
Cutthroat C2	held over	387,596	111,007	Region 1, 5/87
			16,066	Future broodstock
Cutthroat C2	held over	157,849		Region 1, 5/88
Kamloops K2	held over	7,950	6,930	Spring Creek, 5/87

EAGLE HATCHERY

Rick Lowell, Superintendent I

INTRODUCTION

Eagle Hatchery is a state-owned salmonid rearing facility located 12 miles west of Boise. The water supply includes seven artesian wells with a combined flow of 1.9 cfs of 56°F water. Water quality is supersaturated with nitrogen and relatively low dissolved oxygen. Built in 1938, the hatchery building houses the incubation facility of five double high Heath stacks and 16 operational early rearing vats. Rearing units outside consist of: 4 small raceways, 8 large raceways, and one horseshoe pond. Approximately half of this rearing space is available for production. A settling pond receives flows from the hatchery and outside rearing units.

Table 1. Fish requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Kokanee fingerlings	1,500,000	23,600	2%
Brown fingerlings & fry	500,000	129,880	26%
Brook fingerlings	250,000	101,046	40%
Cutthroat fingerlings	50,000	36,344	73%

HATCHERY IMPROVEMENTS

Several improvements were made this year at Eagle Hatchery. A display rack for regulations and pamphlets was constructed for the visitors center. It serves as a useful vehicle in disseminating information to the public. The hatchery received a new truck and riding lawnmower as well. Also, the pump for the packed column treating the hatchery building intake was rebuilt. Screens for the vats and outside raceways were replaced and all 16 vats were painted. The incubation line to the Heath stacks was rebuilt, which increased the flow from an average of 3 gpm to 5.5 gpm per stack.

FISH HEALTH

Once again, most losses occurred during incubation and early rearing. Gas supersaturation and fungal infestations of eggs were the two most dominant causes of mortality. Viral and bacterial workups on the Deadwood kokanee yielded negative results. Mortality at Eagle Hatchery caused by pathogens was not documented during the 1986-1987 fish year. Consequently, all fish were produced without the use of medication.

PUBLIC RELATIONS

Over 21,000 people signed the visitors register during the period October 1, 1986 to September 30, 1987. Several tours were given to elementary schools, YMCA, and cub scout groups. These groups accounted for appproximately one-half of the individuals visiting the hatchery. May through July were the peak months for tours.

Five thousand eyed brown trout eggs were given to a Boise sportsmen's group for a vibert box program.

Eagle Hatchery provided work hours for young people performing community service time.

Deadwood Reservoir - Early Kokanee Trapping and Spawning

In 1930, the dam was completed on the Deadwood River to form Deadwood Reservoir. The dam was built by the Bureau of Reclamation for the purpose of irrigation storage.

Deadwood Reservoir is located about 2.5 hours (105 miles) north by northeast of Boise. Travel north on Hwy. 55 to Banks, then east along the South Fork of the Payette River, turn north on Scott Mountain Road (Forest Service Road 1555) to Deadwood Reservoir.

Kokanee were planted in Deadwood Reservoir from Anderson Ranch stock. Reservoir conditions, including low productivity due to the granitic underlayment and excellent reproductive success in the river, led to declining kokanee size. In 1968, the Department was looking into ways to block the kokanee run up the Deadwood River. Spawning kokanee were in the five-inch class at this time. Around 1971-1972, the reservoir was drawn down and treated. The kokanee population was eradicated with the exception of eggs and/or fry in the gravel. By 1975, the reservoir boasted sixteen-inch kokanee. In 1976, kokanee were twelve inches. 1977 kokanee were eight inches, and in 1978 kokanee were four inches (Will Reid, personal communication). An old timer spoke of putting "eleven of 'em in a pint jar."

Near 1980, a migration barrier was constructed by the Forest Service in the Deadwood River above the Wild Buck tributary to limit reproductive success. Kokanee size increased, and a dip net and snag fishery gained popularity.

Deadwood Reservoir was identified as a source of early kokanee spawn during the sumer of 1986. A site was chosen, a trap set up on 8/9/86, and on 8/16/86, 40 to 60 adults were trapped. The run peaked about 8/18/86. Over 67,000 eggs were taken. Run strength was encouraging. An estimated 5,000+ adults ran up the Deadwood River. Most of the spawning adults utilized Basin Creek and Wild Buck Creek. Adults trapped averaged 13.6 inches.

This initial trapping set the stage for project modifications. Kokanee will not jump with the intensity of other Pacific salmon. Spawning adults would stage in the Deadwood River, but ultimately spawn in the tributaries. A need to alter the trap site was addressed.

In July of 1987, a trap site located about a mile upstream of the slack water was selected. Riverside Campground (Forest Service) provides an excellent access point. Arrangement with the Lowman Ranger District will reserve a site for trap-tending personnel. The contact is:

District Ranger
Pat Aguilar
HC-76 Box 3020
Lowman, Idaho 83637
Phone: 259-3361

On August 10, 1987, the trap was set up in the Deadwood River between Basin Creek and Wild Buck Creek. This location is about 1/2 mile downstream from the migration barrier.

On 8/13/88, 300 to 400 adult kokanee were in the trap. Run increased to a peak around 8/20/88. Approximately 2,000 pounds at 1.5 per pound (or 3,000 adults) were hauled to Eagle Hatchery to ripen and spawn. 900 adults were spawned on-site at Deadwood. A total of 1,828 females were spawned along with over 1,900 males. Total egg take was 958,492. This yields a fecundity rate of 524 eggs per female. The run ends about September 8. By September 11, most fish in the river are "broken down" and/or spawned out and dying.

A synopsis of events for FY '86 and FY '87 are as follows:

	FY '86	FY '87
Start of run	8/11	8/9
Peak of run	8/22	8/20
End of run	9/2	9/8
First spawn	8/25	8/23
Last spawn	9/2	9/14

It should be noted, 1/3 of the run was released to spawn wild. Total numbers of adults (run strength) estimated as follows:

Basin Creek	=	5,000
Wild Buck Cr.	=	5,000
Deadwood R.	=	3,000
TOTAL		13,000

Length frequency graphs were drawn up with data collected from random sampling of the 1987 spawning adults (see attached). Interpretation of these graphs reveals two distinct year classes and possibly a third. None of these fish were aged. However, one could assume an age of three years for fish peaking at 11.0 inches to 11.25 inches and four years for fish peaking 13.0 inches to 13.25 inches. Fish over 14.25 inches may be five-year-old fish. Scale reading to confirm ages needs to be done.

For trend perspective, the average length of females in 1986 was 14.16 inches and average length of males was 13.47 inches. The average length of females in 1987 was 11.94 inches and average length of males was 12.27 inches. It should be noted, length data from 1986 was biased by measuring adults that were able to traverse a partial velocity barrier. For future tracking of length frequency data, the 1987 results represent credible data.

Kokanee adults were screened by the Eagle Fish Health Laboratory. Sixty kidney/spleen/gill samples and thirty ovarian fluid samples submitted were found to be virus and BKD negative (1987). Similar viral sampling in 1986 was also negative.

Future egg taking goals are for 1.7 million in 1988. This should be attainable with the suggestions below:

1. Trap below Basin Creek;
2. Hold 3,200 adults at Eagle Hatchery;
3. Hire two Bio-aides to alternate duty;
4. Install upwellers at Eagle for eye-up; and
5. Utilize Nampa Hatchery personnel for spawning, hauling, etc.

Table 2. Eggs received at Eagle Hatchery.

Species/ strain	Received date	Source	Number	Percent hatch	Destination & date	Expected yield	Cost
Brown BN Plymouth Rock	11/18/86	Saratoga NFH	309,600	96	Fry/fingerlings/Region 3 3/87 to 10/87	130,000	$1,957.56
Brook BK Ford	12/17/86	Ford SFH	160,262	97	Fingerlings/Region 3; 5/87	101,046	$1,522.05
Cutthroat C4 Fine-spotted	1/15/87	Auburn SFH	50,680	85	Fingerlings/Regions 4 & 5; 5/87 Fingerlings/Region 6; 7/87	36,000	$ 545.4
Total							$4,025.09

Table 3. Fry production at Eagle Hatchery.

Species & strain	Source & date	Yield number	Yield pounds	Percent survival	Destination & date	Cost
Brown BN Plymouth Rock	Saratoga NFH 11/18/86	65,000	495.0	29%	Fry/Region 4/87-5/87	$10,823.71

Table 4. Fingerling production at Eagle Hatchery, 1987 Fish Year.

Species/ strain	Source & date	Received number	Received pounds	Yield number	Yield pounds	Percent survival	Destination & date	Cost
Kokanee KE Deadwood	Deadwood 8/87 to 9/87			23,600	235.5	35.5%	Fingerlings/Region 3 Lucky Peak, 3/26/87	$ 2,575.8
Brown BN Plymouth Rock	Saratoga NFH 11/27/87			13,000	135.8	29.0%	Fingerlings/Region 3 3/30/87 to 7/9/87	$ 2,164.0
Brown BN Plymouth Rock	Ashton SFH 5/27/87	50,000	321.0	40,000	812.4	88.0%	Fingerlings/Region 3 N. Fk. Payette, 7/9/87-9/23/87	$ 6,660.8
Brook•BK Ford	Ford NFH 12/17/86			101,046	1,008.0	63.0%	Fingerlings/Region 3; 5/87 73,000 shipped to Clark Fork 5/5/87	$16,815.9
Cutthroat C4 Fine-spotted	Auburn SFH 1/15/87			36,344	935.2	72.0%	Fingerling/Regions 4, 5, & 6 6/5/87 to 7/13/87	$ 6,026.5

Table 5. Catchable production at Eagle Hatchery, 1986-1987 Fish Year.

Species & strain	Source & date	Received number	Received pounds	Yield number	Yield pounds	Percent survival	Destination & date	Cost
Brown BN Plymouth Rock	Saratoga NFH			11,880	1,100.0	29.0%	Catchables/Region 3 Weiser River, 9/87	$1,978.21
Rainbow R4 Mt. Lassen	Am. Falls SFH	1,300	500.0	1,000	385.0	77.0%	Catchables/Region 3 Boise River @ Eagle access site, 8/20/87	$180.20

Table 6. Spawning early kokanee, August 23, 1987 to September 14, 1987.

Number spawned	Eggs/ female	Total eggs	Female age	Destination & date	Expected yield	Cost
1,828	524	958,492		Fingerlings/Statewide 3/88 through 6/88	400,000	$1,749.00

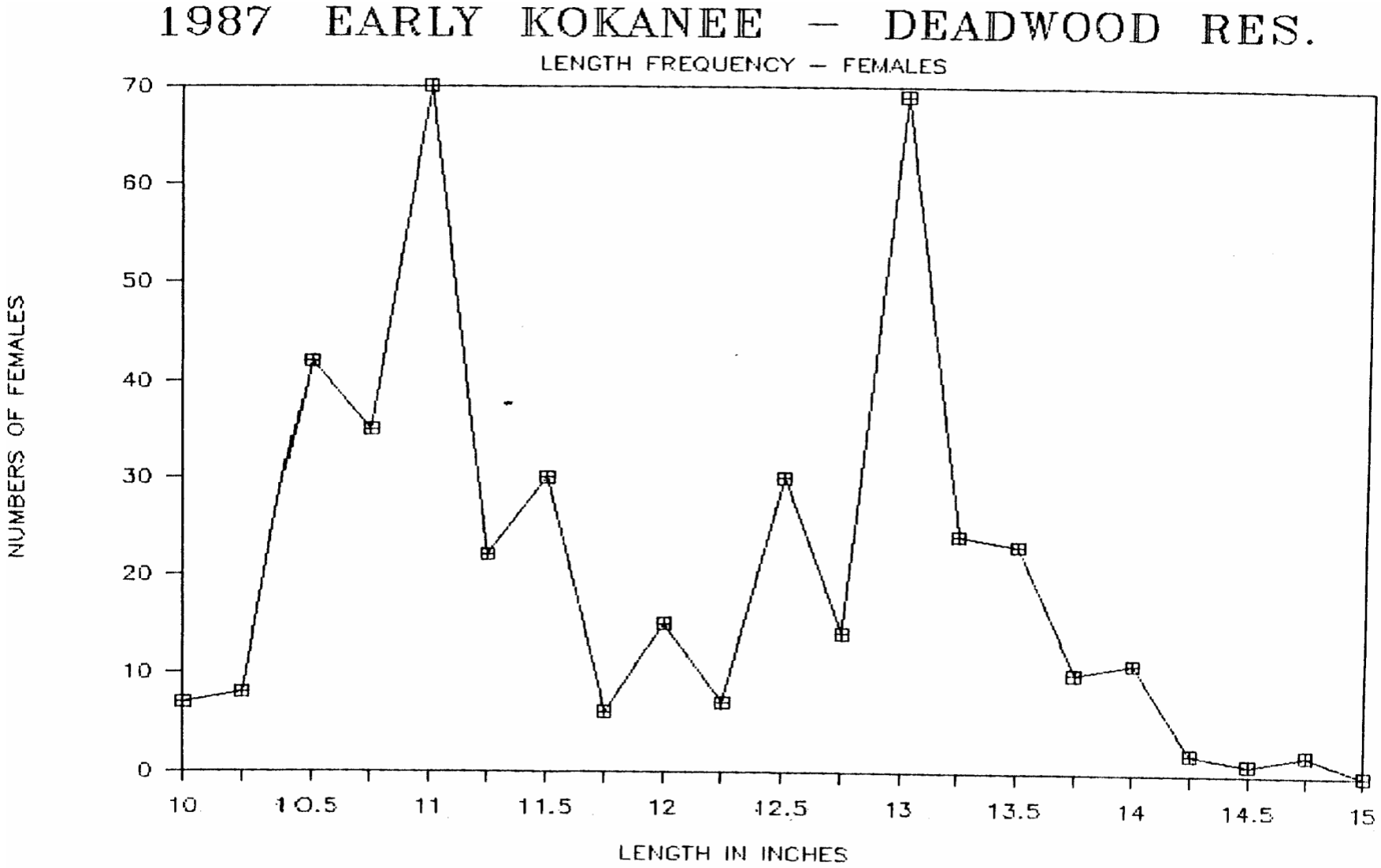

Figure 1. Length frequency of female kokanee, 1987.

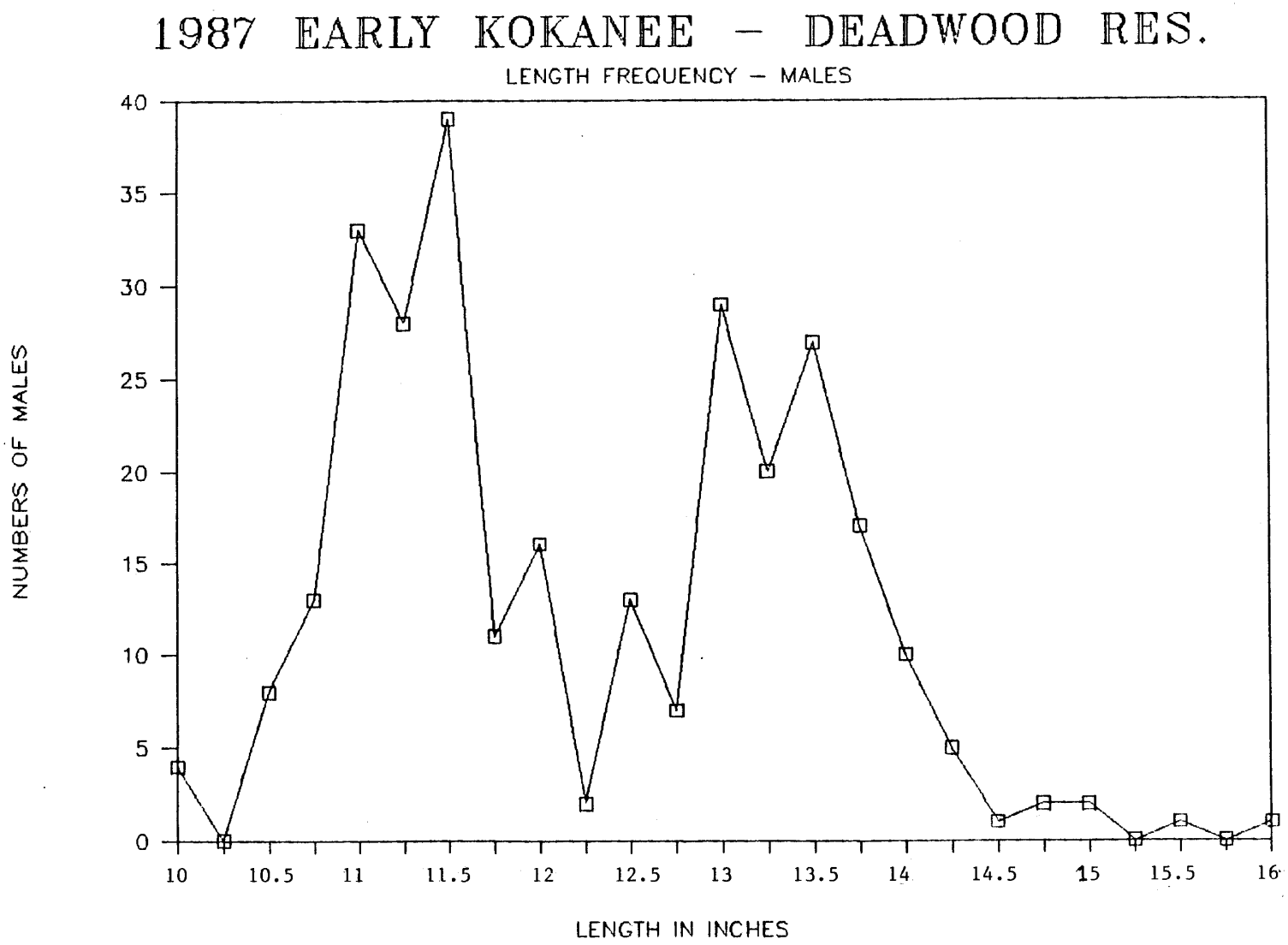

Figure 2. Length frequency of male kokanee, 1987.

Idaho Department Of Fish end Game
Resident Hatcheries Fish Production Summary
10/1/86 – 9/30/87

Hatchery	Catchable		Fingerlings		Fish food		Total	Feed	Total	Cost/	Coet/
	Number	Pounds	Number	Pounds	Pounds	Costs	pounds	conversion	coat	1000 fish	pound
Hagerman	1,318,698	488,818	1,712,635	32,445	749,380	$131,924	519,383	1.42	$302,100	$99.87	$0.57
Nampa	858,433	209,822	881,838	34,365	370,730	$67,896	244,187	1.52	$201,900	$153.07	$0.83
American Falls	487,194	180,308	279,480	6,825	241,520	$44,168	188,931	1.29	$143,100	$186.57	$0.77
Mackay	117,786	62,455	3,153,464	73,436	143,974	$27,975	125,890	1.14	$109,200	$33.38	$0.88
Grece	376,299	119,920	102,098	4,840	171,341	$32,196	124,780	1.37	$140,600	$294.14	$1.13
Hayepur	338,884	110,135	707,035	9,088	182,430	$32,908	119,223	1.53	$143,000	$137.10	$1.20
Ashton	59,595	21,485	1,959,767	18,559	45,200	$10,588	38,044	1.19	$82,100	$40.88	$2.15
Cabinet Gorge			4,980,123	13,972	17,974	$8,576	• 13,972	1.28	$163,900	$33.04	$11.73
Clerk Fork			2,958,153	7,878	19,100	$8,183	7,978	2.39	$109,400	$38.98	$13.72
Eagle			291,940	5,108	4,3.00	$1,336	6,108	0.84	$53,000	$182.13	$10.38
McCall			264,788	865	450	$286	655	0.89	$28,000	$106.08	$42.76
Henrys Lake			338,942	973	350	$129	973	0.38	$41,900	$123.60	$43.08
Totals	3,354,668	1,181,041	17,391,233	206,039	1,948,729	$388,157	1,387,080	1.39⁰	$1.518.200	$73.13•	$1.08•

Total cost for each hatchery 1s that hatchery's total budget minus capital outlay expenditures. •Denotes weighted means

R9FS366BM

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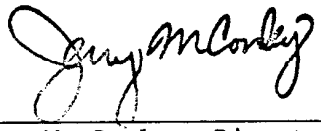
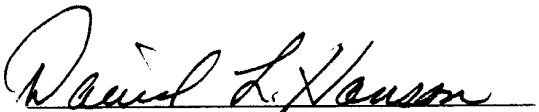


Jerry M. Conley, Director



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